

# **DRAFT Preliminary Design Report**

Bayview Street Bridge #5835  
over  
I-295

Yarmouth, Maine

WIN 022380.00



**Maine Department of Transportation  
Bridge Program**

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## BACKGROUND INFORMATION

<b>TOWN</b>	Yarmouth	<b>WIN</b>	022380.00	<b>BRIDGE NO.</b>	5835
<b>BRIDGE</b>	Bayview Street Bridge			<b>ROAD</b>	Bayview Street
<b>FUNDING:</b>	Federal/State				
<b>PROGRAM SCOPE:</b>	Bridge Deck Replacement				
<b>PROGRAM DESCRIPTION:</b>	Bayview Street/ I-295 Bridge (#5835) over Interstate 295. Located 0.09 of a mile east of Spring Street.				
<b>PROJECT BACKGROUND:</b>	This bridge was constructed in 1962. The deck is in poor condition. The project is funded for PE, ROW, CONS, and CE in the 18/19/20 WP.				
	<b>JURISDICTION</b>	Townway		<b>NHS</b>	No
<b>FUNCTIONAL CLASSIFICATION</b>	Local Road		<b>CORRIDOR PRIORITY</b>	6	
	<b>URBAN/RURAL</b>	Urban		<b>FHWA SUFFICIENCY RATING</b>	48.6
	<b>POSTED SPEED</b>	25 mph		<b>LOAD POSTING</b>	N/A
<b>TRAFFIC:</b>	2019	<b>AADT</b>	1,900	<b>ACCIDENT DATA, CRF</b>	0.0
	2039	<b>AADT</b>	2,090	<b>DHV</b>	230

## EXISTING BRIDGE

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**YEAR BUILT** 1962      **SPAN LENGTHS** 50.5'-63'-63'-50.5'      **CURB TO CURB WIDTH** 24.0'

**TYPE OF SUPERSTRUCTURE:** Four-span continuous structure with painted steel beams, non-composite cast-in-place deck, bituminous wearing surface with membrane waterproofing, and combination concrete and aluminum bridge rail.

**GENERAL CONDITION:** Steel beams are in good condition with minor deterioration at the beam ends. The coating system is in satisfactory condition. Concrete deck is in poor condition with some rust staining, efflorescence, and leakage on the bottom. Wearing surface is in poor condition with prevalent cracking. Both joints have approach pavement cracking, armor damage, and tears in the seals.

**TYPE OF SUBSTRUCTURE:** Stub concrete abutments supported by H-piles. Three-column concrete piers supported by H-piles.

**GENERAL CONDITION:** The concrete backwalls for both abutments exhibit areas of delamination, spalls, and cracking. The abutment breastwalls and wingwalls are in good condition. The concrete piers exhibit minor delamination and cracking in the caps and columns. In general, the substructure is in satisfactory condition.

<b>LOAD RATINGS:</b> (by MaineDOT)	<b>OPERATING</b> 40.8 Tons	<b>INVENTORY</b> 26.3 Tons
HL-93		

**STRUCTURALLY DEFICIENT** No      **FUNCTIONALLY OBSOLETE** No

**MAINTENANCE PROBLEMS:** Cracking of bituminous wearing surface. Erosion of slope paving from discharge of deck drains.

**MAINTENANCE WORK:** Structural steel painted in 2009. Concrete surfaces treated with protective coating in 2017 (WIN 021762.00).

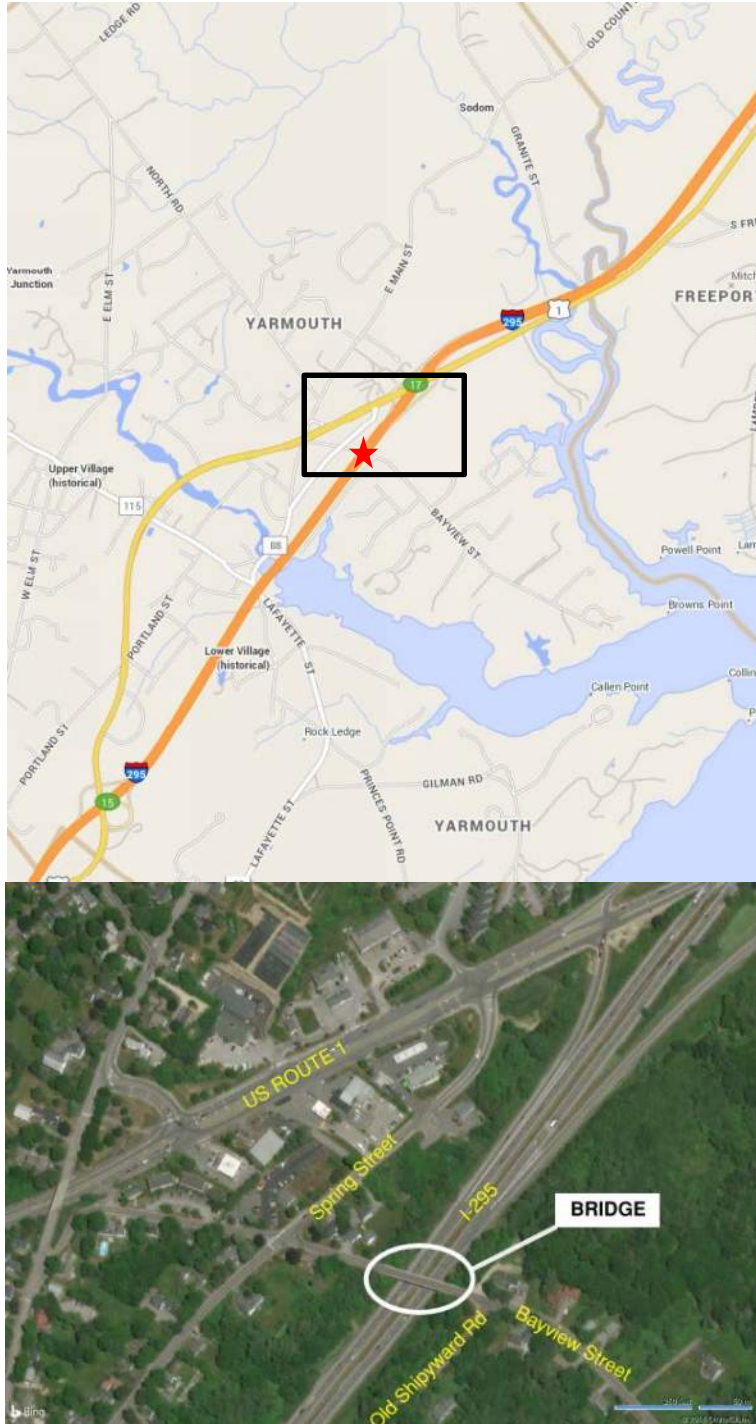
**PREVIOUS STRUCTURE:** None.

**OTHER COMMENTS:** The Town of Yarmouth has a force sewer main attached to the southerly fascia of the bridge.



## LOCATION MAP

Yarmouth, Bayview Street Bridge #5835, WIN 022380.00  
Bayview Street over I-295



Latitude: 43° 48' 14.55" N, Longitude: 70° 10' 13.68" W

Top map is from MaineDOT Public Map Viewer and bottom aerial is a Bing Map image.

## BRIDGE RECOMMENDATION FORM

**WIN** 022380.00 **TOWN** Yarmouth  
**BRIDGE NO.** 5835 **BRIDGE** Bayview Street Bridge

**DESIGNED BY** Hoyle, Tanner **DATE** 11/16/2018  
**APPROVED BY** \_\_\_\_\_ **DATE** \_\_\_\_\_  
**APPROVED BY** \_\_\_\_\_ **DATE** \_\_\_\_\_

**PROJECT:** Bridge Deck Replacement with 320' of approaches, including transitions.

**ALIGNMENT DESCRIPTION:** Horizontal - tangent on bridge with curves located on each end of the project to match into the existing alignment. Vertical - a crest curve with a finished grade about 0.2' higher than the existing profile. New centerline is located 3' northerly of bridge centerline to accommodate new sidewalk on the southerly side.

**APPROACH SECTION:** Two 10'-6" lanes with 1'-6" shoulders. 6' bituminous concrete sidewalk on southerly side of roadway.

**SPANS** Retain existing (50.5'-63'-63'-50.5') **SKEW** 21° ahead on left

**LOADING** HL-93 **DESIGN SPEED** 25 mph

**SUPERSTRUCTURE:** Retain existing steel beams made composite with a new, wider (2'-4") concrete deck slab using stud shear connectors. Retain existing bridge shoes. New 9" concrete deck slab including 1" integral wearing surface and a 2% normal crown. 24' curb-to-curb with a 6' sidewalk on the southerly side. Standard 3-bar and 4-bar bridge railings. Snow screening along both railings. Existing diaphragms are modified and retrofit to modify live load distribution and increase load carrying capacity of existing beams to remain.

**ABUTMENTS:** Retain existing abutments. Reconstruct upper backwalls and upper wingwalls to accommodate new widened deck. New 10' buried approach slabs at each abutment.

**PIERS:** Retain existing. No proposed work at this time.

VERTICAL CLEARANCE	EXISTING	PROPOSED
I-295 NB	16.3 FT	16.3 FT

**AVAILABLE SOILS INFORMATION:** Existing plans and preliminary borings show bedrock or refusal at about 90' below the roadway.

**ADDITIONAL DESIGN FEATURES:** A sidewalk with a 7" curb reveal and a width of 6'-0" is proposed. Although this width and reveal height is not a standard MaineDOT detail, it is a standard configuration that is used in New Hampshire and it provides the lower curb reveal requested by locals during the Bridge Advisory Group meetings. This

configuration also allows the thickness of the brush curb edge of the sidewalk to match the 9" thick brush curb prior to constructing the 6' sidewalk in the last stage of work.

**MAINTENANCE OF TRAFFIC:** Maintain one lane of alternating traffic using temporary signals and staged construction.

**CONSTRUCTION SCHEDULE:** One construction season including any landscaping required.

**ADVERTISING DATE:** November 2019

	<b>Program Amount</b>	<b>Available Funding</b>	<b>Estimated Project Cost</b>	<b>Shortfall/ Surplus</b>
Preliminary Engineering	\$120,000		\$180,000	-\$180,000
Right-of-Way	\$5,000		\$15,000	-\$15,000
Construction [	Structure		\$1,585,000	-\$1,585,000
	Approaches		\$175,000	-\$175,000
Construction Engineering	\$80,000		\$245,000	-\$245,000
Total	\$1,405,000	\$0	\$2,200,000	-\$2,200,000

**ADDITIONAL BORINGS REQUIRED?** No

**ADDITIONAL GEOTECHNICAL EVALUATIONS REQUIRED?** No

**APPROVED DESIGN EXCEPTIONS:** None.

**COMMENTS BY ENGINEER OF DESIGN:**

## SUMMARY OF EXPECTED IMPACTS

**RIGHT OF WAY**                      Number of:      Property Owners                      6  
    Buildings to Be Taken                      0

Type of Acquisitions:      ☒ Fee Simple                      ☒ Easement  
    ☐ Temporary Rights                      ☐ Temporary Road

**UTILITIES:** Fairpoint, CMP, Town of Yarmouth Sewer, Charter Communications

**COAST GUARD PERMIT NEEDED?** No

**FAA PERMIT NEEDED?** No

### ENVIRONMENTAL COORDINATION

**Team Member:** Kristen Chamberlain

<b>NEPA/STIP</b>	
<b>Section 106</b>	
<b>Section 4(f)</b>	
<b>Endangered Species</b>	
<b>Essential Fish Habitat</b>	N/A
<b>Fish Passage</b>	N/A
<b>In-Stream Window</b>	N/A
<b>Hazardous Material</b>	
<b>Dredge Material</b>	N/A
<b>Stormwater/MS4</b>	
<b>DEP/LUPC</b>	
<b>ACOE</b>	
<b>Mitigation</b>	
<b>Other</b>	

**Avoidance & Minimization:** A reduced guardrail berm is proposed to minimize impacts outside of the existing Right-of-Way. At the southwest quadrant, a tangential guardrail terminal is proposed along the back edge of the new sidewalk to minimize property impacts. The existing abutment wingwalls are modified to allow the existing sewer line to remain.

## SUMMARY OF PRELIMINARY DESIGN

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### BACKGROUND

In the previous Work Plan, this bridge project was programmed as a wearing surface and bridge joint replacement project. In the current 18/19/20 Work Plan, the project is programmed as a deck replacement. This change in scope is based on several factors including:

- Town officials and residents have expressed a need for a sidewalk on this bridge. Adding a sidewalk cannot be accomplished in a practical manner without replacing the deck and making it wider.
- The deck shows signs of deterioration including rust stains, leakage, and efflorescence. Future deterioration or spalling increases the risk of debris falling onto I-295.

Prior to preparing a scope of services for this PDR, Hoyle, Tanner met with representatives from the Bridge Program on November 7, 2017, to discuss the goals and alternatives for the preliminary design phase of this project. General parameters and assumptions are:

- No significant work to the existing piers will be completed or roadside barriers along I-295 to increase shielding of existing piers. If required, this will be completed under a future project.
- Construction activities will need to be coordinated with I-295 traffic demand. Night work will be required for some construction operations and full shielding is needed under the bridge and along the sides.
- Replacing bridge shoes or moving fixed bearing locations is not required. Expansion joint locations will be retained at both abutments.

The Department has received letters, comments, and emails from town officials and residents describing the bridge as unsafe for pedestrians and bicyclists based on the lack of a standard sidewalk, the existing roadway width, and the configuration and height of the existing curb and railing system.

### PURPOSE AND NEED

The purpose of the project is to improve the condition of the bridge deck slab and to provide a sidewalk on the bridge that connects to the sidewalk facilities on the approaches.

The need for the project is based on the poor condition (NBIS rating = 4) of the original concrete deck (56 years old) and the lack of a standard sidewalk on the existing bridge with a rail height to accommodate pedestrians and bicyclists.

## **PUBLIC OUTREACH**

A public meeting was held on February 5, 2018 at the Town Office in Yarmouth. During this meeting, an overview of the initial scope was presented for this bridge project and a bridge project carrying US Route 1. The public was encouraged to ask questions and express any concerns that the Department should consider as the preliminary engineering begins. Comments and concerns expressed by attendees at and following the meeting with respect to this bridge include:

- The duration of construction and lane closure.
- Access and lane widths for emergency vehicles and boats/trailers during construction.
- Timing of construction with school year/summer vacation.
- Railing heights and security fencing/screening.
- Interim/temporary fencing along the existing bridge rail.
- Relocating overhead utilities to be carried by the bridge.
- Approach sidewalk treatments and limits.
- Brush encroachment along sides of bridge and walkways.
- Prefer to have a single sidewalk on the southerly side.
- Accommodating bikes with a wider bridge and roadway (although several expressed a desire to keep the roadway width to help deter speeding).
- Speed bumps or other measures to reduce vehicle speeds.
- Potential to widen bridge with substructure widening.
- Opportunities to work and partner with the Department during the design process.
- An option that includes a separate bike/pedestrian bridge.
- Consider the importance of this bridge where it is the only access road for the people and businesses on the peninsula and that it crosses I-295.

Public outreach and input for this bridge project also included two Bridge Advisory Group (BAG) meetings with a select group of local citizens and town officials to discuss potential alternatives and priority of needs or treatments. These meetings were held on May 23, 2018 and September 12, 2018. The first meeting focused on setting goals, metrics for success, and identifying and prioritizing project concerns. The second meeting presented a concept for a new typical section and approximate limits of the project. At this last meeting, there was support for the proposed concept and approximate project extents. Comments and concerns that were expressed by the BAG included:

- Drainage structures should have bicycle friendly grates and frames.
- Consider striping lanes less than 11' wide to help deter speeding.

- Consider reducing the height of the sidewalk curb on the bridge so that it is similar in height to the curb on the approaches.
- Bridge rail heights need to be higher than existing for pedestrians and bicyclists.
- ADA compliant sidewalks and tip downs.
- Extend snow fencing along the entire bridge if intersection and drive site distance is acceptable.
- Maintenance of traffic and duration that the bridge is limited to one lane. Coordination with businesses that move boats across bridge during construction.
- Schedule of the project and/or construction year.
- Impacts to I-295 traffic during the work.
- Temporary roadway widths to accommodate trucks, trailers, boat transport.
- Other “on-bridge” utilities (i.e. future gas?).

## **MAINTENANCE OF TRAFFIC**

Bayview Street is the only access for about 270 homes and businesses located on a peninsula bounded by the Cousins River to the north, the Royal River to the south, and Interstate 295 to the west. The Bayview Street Bridge also crosses I-295, one of the most heavily traveled transportation corridors in the State, with an average ADT over 27,000 in each direction. As such, maintaining traffic on Bayview Street and minimizing disruptions to I-295 traffic is a paramount consideration for this project.

### **BAYVIEW STREET**

Viable options for maintenance of traffic on Bayview Street are limited. A bridge closure is not feasible since there are no detours available for local traffic. A temporary bridge is not prudent since the construction cost would more than double for this deck replacement project and the temporary alignment would impact abutting properties. The only practical option is to use staged construction. This requires a portion of the bridge to be open to traffic while the other portion is under construction. Based on the traffic analyses completed by the Department, queue lengths are expected to be relatively short (less than 70') and not extend to Spring Street at the west approach. During construction, a reduced work zone speed should also be considered.

A multi-stage sequence for replacing the bridge deck and adding a new sidewalk is depicted in the Preliminary Plans. The stages are generally described as follows:

#### STAGE I

- Install temporary work zone controls and protection on Bayview Street.
- Install temporary shielding on the underside of the bridge and along the sides of the bridge. This requires short-duration lane and shoulder closures on I-295 that will be completed at night when traffic volumes are lower.
- Reinforce the existing north curb to accommodate temporary modifications that will provide a 12' roadway on the northerly side (This might include drilling full-depth holes for supplemental threaded rods and strapping plates). After the curb is reinforced, sawcut and remove about 26" of the existing concrete curb. (This work requires a work area adjacent to the curb and limiting the bridge to one lane of alternating traffic).
- Remove existing pavement on the northerly side of the road and install an anchored traffic barrier on the existing deck. This is to provide a work area on the southern portion of the bridge while maintaining a 12' roadway width on the northern portion. (12' temporary roadway is recommended to accommodate commercial traffic and trailers).
- Sawcut the existing deck and approach slabs near the center of the existing roadway and beam #3. Remove the southern portion of the bridge deck and approach slabs. (Temporary support of excavation is not anticipated with the existing at-grade approach slabs).
- Reconstruct the upper backwalls and wingwalls.
- Construct a buried, 10' long approach slab at each abutment.
- Construct the deck slab with a brush curb and bridge rail.
- Install a temporary braced barrier on the newly constructed deck to provide a 12' roadway width (and approximately 1' of deck clearance behind the barrier).

#### STAGE II

- Shift traffic to the southern portion of the bridge constructed in stage I.
- Remove the northern portion of the bridge deck and approach slabs.
- Reconstruct remaining upper backwalls and wingwalls.
- Construct a buried, 10' long approach slab at each abutment.
- Construct the deck slab on the northern portion of the bridge with a new brush curb and steel bridge railing. Saw groove the bare deck surface within the work area.



### STAGE III

- Shift traffic to the northern portion of the bridge constructed in stage II.
- Construct a 6' wide sidewalk on the southerly side of the bridge and approaches.

### STAGE IV

- Remove temporary concrete barrier and finish saw grooving the deck.
- Open the bridge to two lanes of two-way traffic and finish approach roadway construction and miscellaneous work.
- Remove temporary shielding and other staging during evening hours when short duration lane closures on I-295 are allowed.

### I-295

Traffic will be maintained on I-295 during construction except for short duration lane and/or shoulder closures required for the following operations:

- Setting up work zone and traffic control signs along I-295.
- Erecting/removing shielding under and around the Bayview Street Bridge.
- Removing work zone and traffic control signs along I-295.

Based on the “heat maps” provided by the Department short duration lane and shoulder closures are limited to night time hours only when the capacity of I-295 can be maintained with one lane.

Conclusion: Staged construction of the Bayview Street Bridge is recommended with one lane of alternating traffic using temporary traffic signals. During construction, pedestrians and bicyclists share the road (like existing conditions) with vehicular traffic.

### UTILITIES

#### OVERHEAD ELECTRIC/COMMUNICATIONS (Need input from MaineDOT)

The upper power lines may need to be alley armed further south to provide clearance for a potential concrete pump truck to assist the Contractor in placing the deck during staged construction. If snow fencing along the southerly side of the deck is too close to the electrical wires (allowing for sag), these wires or poles may need to be relocated to prevent arcing. Several poles may also need to be relocated to accommodate the new sidewalk.

In addition, the existing service pole located at Station 108+20 LT on the east approach is located within the clear zone on the outer side of the roadway curve. Relocation of this pole beyond the clear zone (10' from travel way) should be considered.

## SEWER

During construction, the existing high-pressure sewer along the southern side of the bridge will be retained and remain in service. Manholes on the approaches will require minor rim adjustments to accommodate new pavement grades.

## OTHER (Need input from MaineDOT)

The existing conduits in the curb are (abandoned?) ....

## **RIGHT OF WAY**

The existing Right of Way (R/W) is about 50' wide along Bayview Street. However, there is more clearance to the existing R/W on the northerly edge of the roadway compared to the southerly edge. As a result, there are slope and drainage impacts along the south side of the road at the west approach to the bridge. Two property owners are impacted at this location.

## **SUMMARY OF ALTERNATIVES**

The following alternatives were considered:

1. Do nothing
2. Replace the deck with a 9" thick slab including a 1" integral wearing surface
3. Replace the deck with a 7" thick slab (like existing) with a 3" bituminous pavement wearing surface over a ¼" high-performance waterproofing membrane.

### ***Alternative 1: Do Nothing***

The wearing surface and deck of this bridge is in poor condition and must be replaced. Doing nothing does not meet the purpose and need. Therefore, it is not prudent to defer the deck replacement for this bridge.

### ***Alternative 2: 9" deck slab with integral wearing surface***

This alternative consists of a new deck slab that is 33'-4" wide with 3'-2" deck overhangs at the exterior beams. The deck is 2'-4" wider than the existing deck to accommodate staged construction (see Maintenance of Traffic section) and the addition of a 6' sidewalk on the southerly side of the roadway. The typical section includes a 24' roadway (1.5' shoulder, 10.5' lane, 10.5' lane, 1.5' shoulder) with a 6' sidewalk. The centerline of the roadway is shifted 3' to the north to accommodate the new typical section. The railing system includes a galvanized 3-bar rail (42" height) with snow screening (5' ± tall) along the brush curb and a galvanized 4-bar rail (42" height) with protective screening (5' ± tall) along the sidewalk.

The total thickness of the deck and integral wearing surface of this alternative (9") closely matches the original design thickness (7" slab + 2.25" pavement with membrane = 9.25").

Therefore, the minimum profile raise requirement is about +0.1' to accommodate the 3' northerly alignment shift and crown relocation to accommodate the new sidewalk on the bridge.

The superstructure dead load for this alternative is within 5% of the existing superstructure dead load.

Steel beam bridges that are designed in accordance with the AASHTO LRFD Bridge Design Specifications are usually governed by the exterior beams. This is attributed to the following:

- The live load distribution factor is often highest for the exterior beams when the bridge superstructure deflects and rotates as a rigid cross-section per Article 4.6.2.2.2d.
- Additional dead loads from railings, curbs, or utilities are more heavily proportioned to exterior beams (particularly when constructed in stages and such loads cannot be redistributed to more beams).
- Reduced deck width contributing to the flexural resistance compared to an interior beam (usually deck overhangs are less than half of the typical beam spacing in a bridge superstructure).

The existing superstructure was designed with an older specification (1953 AASHO and ASD method) that permitted the exterior beams to have less load carrying capacity than the interior beams. The existing 3'-6" wide curb and 2'-0" wide deck overhang results in a lower live load distribution factor (conventional lever-rule method) for the exterior beam compared to an interior beam. As a result, the exterior beams are a lighter section (W30x108) compared to the interior beams (W30x116). Therefore, the exterior beam capacity controls the deck widening and load rating for this bridge.

Hoyle, Tanner used the MERLIN-DASH Version 6.2 software program to analyze and load rate preliminary configurations with an HL-93 design vehicle loading. Based on the existing framing plan and proposed superstructure configuration and loadings, all beam lines initially rated less than 1.0 near the pier regions at the inventory level. The following strategies were evaluated to potentially increase the inventory rating of the beams to 1.0 or greater:

1. Account for the permissible reduction in the live load multiple presence factor at bridge sites with average daily truck traffic less than 5000 in one direction. This reduces the live load force effects in accordance with AASHTO C3.6.1.1.2 by 10%.
2. Increase the area of longitudinal reinforcing steel in the deck over the piers for all beams.

3. Modify existing intermediate diaphragms in exterior bays so that the rigid section live-load distribution factors from AASHTO do not apply for the exterior beams (allowing a 14% lower live load distribution factor to be used). Diaphragm modification concepts are included in Appendix E.
4. Add supplemental diaphragms near the pier for all beams to reduce the unbraced length of the compression flange (this increases negative moment capacity by allowing flanges to reach the yield stress).
5. Reduce dead load (adding a foam/void section to the proposed sidewalk and curb;  $\frac{3}{4}$ " integral wearing surface versus 1" for a total deck thickness of  $8\frac{3}{4}$ ").
6. Relocate the existing sewer main that is mounted to the fascia to the interior bay under the sidewalk so that half of the weight is distributed to an interior beam.
7. Retrofit the existing beams by making them simple spans at the piers.
8. Add additional cover plates to the beams at the piers.

Strategies 1 thru 5 are the most cost-effective and minimize impacts to I-295 traffic and the existing sewer main. Therefore, a combination of these strategies was evaluated. Our analyses indicate that an inventory rating factor of 1.0 can be achieved for Alternative 2 with the following modifications:

- Reduce the live load multiple presence factor per AASHTO based on the ADTT.
- Use #6@6" for the top mat of longitudinal reinforcing steel over the piers.
- Replace intermediate diaphragms in exterior bays with smaller "hinging-type" diaphragms.
- Install new supplemental diaphragms on each side of the piers (exact number and location to be determined in final design).

During staged construction of the bridge, the operating rating factor is above 1.0.

Since Bayview Street is a HCP 6 roadway, per *Engineering Instruction S1 - Design Load Capacity for the Rehabilitation of Vehicular Bridges*, a design-level inventory rating factor less than 1.0 is permissible. If a rating factor of 1.0 or less for Maine Legal Loads is used for this bridge, some of the modifications described above can be eliminated or minimized. However, the modifications to meet HL-93 loading are not complex and do not add substantial cost for this bridge to meet design standards.

The 9" deck with 1" integral wearing surface is expected to provide a 60-year service life. The initial deck grooving removes approximately  $\frac{1}{4}$ " from the integral concrete wearing surface and then subsequent grooving of  $\frac{1}{4}$ " is expected about every 15 years (interval based on published averages from American Concrete Pavement Association and performance of several bridges in New Hampshire). At the end of the deck life, it is reasonable to assume the entire bridge will

require replacement based on condition and future traffic and user needs for I-295 and Bayview Street. If diamond grinding is used in lieu of deck grooving, a similar deck service life is expected with more routine wearing surface grindings to maintain an adequate roughness of the deck.

The estimated minimum lane closure duration for this alternative is 123 days and is anticipated to occur in April through mid-October.

The estimated construction cost of Alternative 2 is \$1,760,000.

***Alternative 3: 7" deck slab with 3¼" pavement and high-performance membrane***

This alternative includes a typical section that is similar to Alternative 2 except that the deck slab is thinner, and the curb and sidewalk is thicker (by approximately 3.25").

The total thickness of the deck and wearing surface of this alternative (10.25") is 1" thicker than the original design thickness (7" slab + 2.25" pavement with membrane = 9.25"). Therefore, a minimum profile increase of about 0.14' is required to accommodate the thicker section and the 3' northerly alignment shift/crown relocation.

The superstructure dead load for this alternative is within 5% of the existing superstructure dead load.

A similar analysis and load rating procedure as described for Alternative 2 was completed for Alternative 3. Our analyses indicate that the inventory rating factor slightly less than 1.0 can be achieved for Alternative 3 with similar assumptions and modifications to the superstructure framing.

Since Bayview Street is a HCP 6 roadway, per *Engineering Instruction S1 - Design Load Capacity for the Rehabilitation of Vehicular Bridges*, a design-level inventory rating factor less than 1.0 is permissible. Based on analyses of similar bridges, an HL-93 inventory rating factor slightly less than 1.0 will result in a rating above 1.0 for Maine Legal Loads for this bridge. Some of the modifications described above may be minimized or eliminated if a rating of 1.0 is targeted for Legal Loads. However, the modifications to meet HL-93 loading are not complex and do not add substantial cost for this bridge to meet design standards.

If the Department requires an increase in the reinforcing steel clear cover at the bottom of the deck from the current standard of 1", this will require a thicker deck slab and result in a lower load rating for this alternative. Consequently, the existing pile foundations should be evaluated for the increase in bridge dead load.

The estimated minimum lane closure duration for this alternative is 130 days and is anticipated to occur in April through October. This includes an additional seven days compared to

Alternative #1 for membrane and paving operations on the bridge that are susceptible to delay from deck moisture or weather conditions.

The estimated construction cost of Alternative 2 is \$1,700,000.

**Conclusion:** Alternative 2 - 9" deck slab with integral wearing surface is recommended. This alternative best meets the purpose and need of the project with a 6' sidewalk on the bridge. Although the estimated construction cost for Alternatives 2 is slightly greater (~3.5%) than Alternative 3, the bare deck can be constructed in less time because it does not require specific weather and moisture conditions for membrane waterproofing and multiple paving operations. In addition, Alternative 2 is a more durable design that is expected to require less maintenance and disruption to the traveling public for the remaining service life of this bridge.

## **PROPOSED ALTERNATIVE**

Alternative 2- 9" deck slab with integral wearing includes a 24' (curb-to-curb) roadway that provides two 10'-6" lanes, 1'-6" shoulders, and a 6' sidewalk. The northern railing system includes a standard 3-bar steel railing with a brush curb. The height of this railing is 42" which is the minimum height required for bicyclists or pedestrians. The southern railing system includes a standard 4-bar steel railing mounted on the sidewalk. The height of this railing is 42". A 5'± tall chain-link snow screen fence is provided on the back face of northern railing to shield the I-295 roadway below the bridge from snow and debris thrown by plows and other vehicles. A 5'± tall snow fence is also provided on the back face of the southern railing to shield I-295 from snow.

The upper abutment backwalls and wingwalls will be reconstructed to accommodate the wider bridge deck, new compression seal expansion joints, and new approach slabs. A buried 10' approach slab is recommended to replace the existing at-grade approach slab. No bridge drains are recommended on the new deck. However, new drainage structures or ditch improvements are proposed at all bridge quadrants. New catch basins will be furnished with "bicycle-friendly" grates.

The horizontal alignment accommodates the 3' northerly shift of the centerline of roadway across the bridge for the new sidewalk. At the west approach, a left and right reverse curve with radii of 800' and 5100' respectively, transitions to a 282' tangent across the bridge. At the east approach, a right curve with a radius of 6000' gradually transitions into an existing right curve with a radius of 375' at the limits of work.

The vertical alignment is like the existing with a slight profile raise of about 2" to accommodate the centerline shift noted above. The bridge has a 220' vertical crest curve with an approach grade of 0.91% and a departure grade of -1.20%. At the west approach, a 100' sag curve

transitions to the existing profile. At the east approach, a 104' tangent followed by a 120' sag curve with a departure grade of -0.44% transitions to the existing profile.

The pavement design is based on the Department's Guidance Memo (revised 1/29/18) and consists of 4" hot mix asphalt (HMA) over 20" of gravel. The sidewalk surface is 2" HMA.

The limits of the project are 550' long including approach transitions with an additional 265' of mill and overlay work to match existing pavement at the limits of work.

Disruption to I-295 traffic is minimized with the installation of shielding below the deck and along the sides of the bridge. Short duration lane closures will be limited to evening hours when traffic volumes are low.

Traffic on Bayview Street is maintained with staged construction. A single 12' lane of alternating traffic using temporary traffic signals is provided. The estimated minimum lane closure period is 123 days.

The preliminary project cost estimate of this deck replacement is \$2,200,000. For more information please see Appendix H.

# Appendix A

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## Preliminary Plans



Date:11/14/2018

Username:

Division: BRIDGE

Filename: \\001\BRIDGE\WSTA\001\_Title.dgn

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION



SPECIFICATIONS

Design: Load and Resistance Factor Design per AASHTO LRFD Bridge Design Specifications, Eighth Edition.

DESIGN LOADING

Live Load ..... HL - 93

TRAFFIC DATA

Current (2019) AADT .....1900  
Future (2039) AADT ..... 2090  
DHV - % of AADT ..... 11  
Design Hour Volume .....230  
Heavy Trucks (% of AADT) ..... 4  
Heavy Trucks (% of DHV) ..... 4  
Directional Distribution (% of DHV) ..... 70  
18 kip Equivalent P 2.0 ..... 43  
18 kip Equivalent P 2.5 ..... 41  
Design Speed (mph) ..... 25

MATERIALS

Concrete:  
Curbs & Transition Barriers ..... Class "LP"  
All Other (Unless Noted) ..... Class "A"  
Reinforcing Steel:  
Plain ..... ASTM A 615/A 615M, Grade 60  
Glass Fiber Reinforced Polymer ..... CSA S807-10, ACI 440.1R-15  
Stainless Steel ..... ASTM A 955, Grade 75

BASIC DESIGN STRESSES

Concrete  
Class "A" ..... f 'c = 4,000 psi  
Class "LP" ..... f 'c = 5,000 psi  
Plain Reinforcing Steel ..... f y = 60,000 psi  
Stainless Reinforcing Steel ..... f y = 75,000 psi  
Glass Fiber Reinforced Polymer:  
#5 Bar ..... Fu = 95,000 psi  
E = 6,150,000 psi  
efu = 1.226%

LIST OF DRAWINGS

Title Sheet .....	1
Preliminary Plan .....	2
Preliminary Profile .....	3
Staged Construction .....	4
Typical Sections .....	5
Abutment Details .....	6

YARMOUTH  
CUMBERLAND COUNTY  
BAYVIEW STREET BRIDGE  
OVER  
I-295  
BAYVIEW STREET  
PROJECT NO. 2238000  
PROJECT LENGTH 0.100 mi.  
BRIDGE NO. 5835

DRAFT PDR PLANS  
NOVEMBER 15, 2018

UTILITIES

Central Maine Power Company  
Fairpoint Communications  
Charter Communications  
Town of Yarmouth Sewer

MAINTENANCE OF TRAFFIC

Maintain one lane of alternating two-way traffic using temporary signals and staged construction.



PROJECT LOCATION	Bayview Street/ I-295 Bridge (#5835) over Interstate 295. Located 0.09 of a mile east of Spring Street. Latitude. 43°48'14.55"N Longitude 70°10'13.68"W
PROGRAM AREA	Bridge
OUTLINE OF WORK	Bridge Deck Replacement

WIN 22380.00

2238000

YARMOUTH  
BAYVIEW STREET BRIDGE  
TITLE SHEET

SHEET NUMBER  
1  
OF 6

STATE OF MAINE DEPARTMENT OF TRANSPORTATION	APPROVED	DATE
COMMISSIONER:		
CHIEF ENGINEER:		

SIGNATURE	P.E. NUMBER	DATE

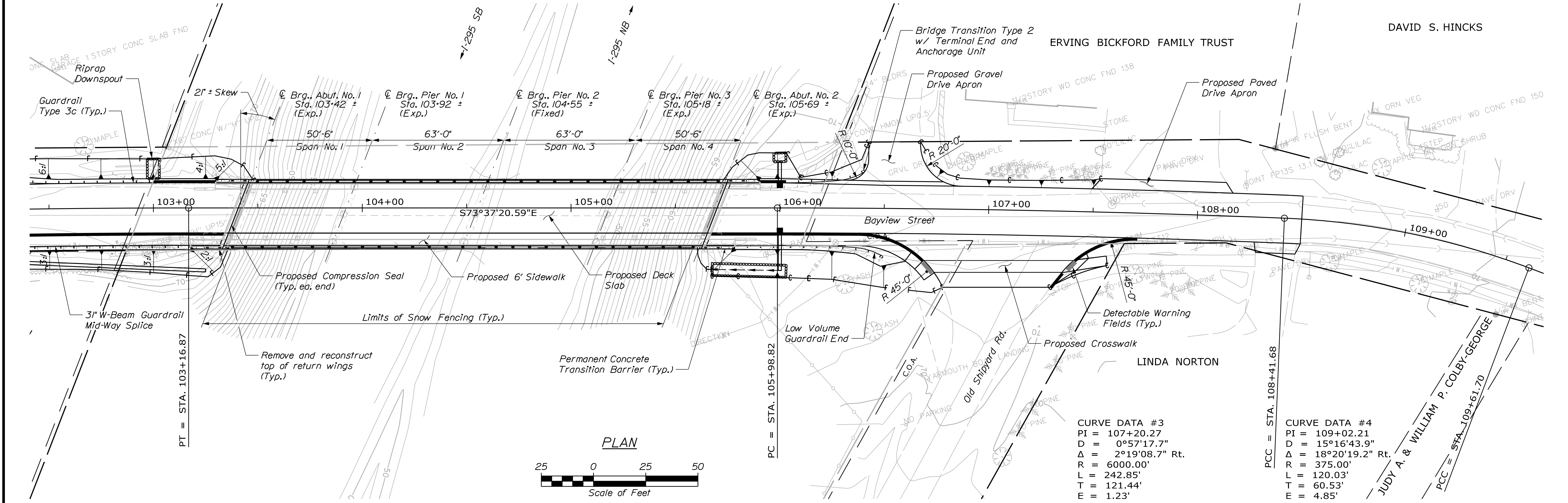
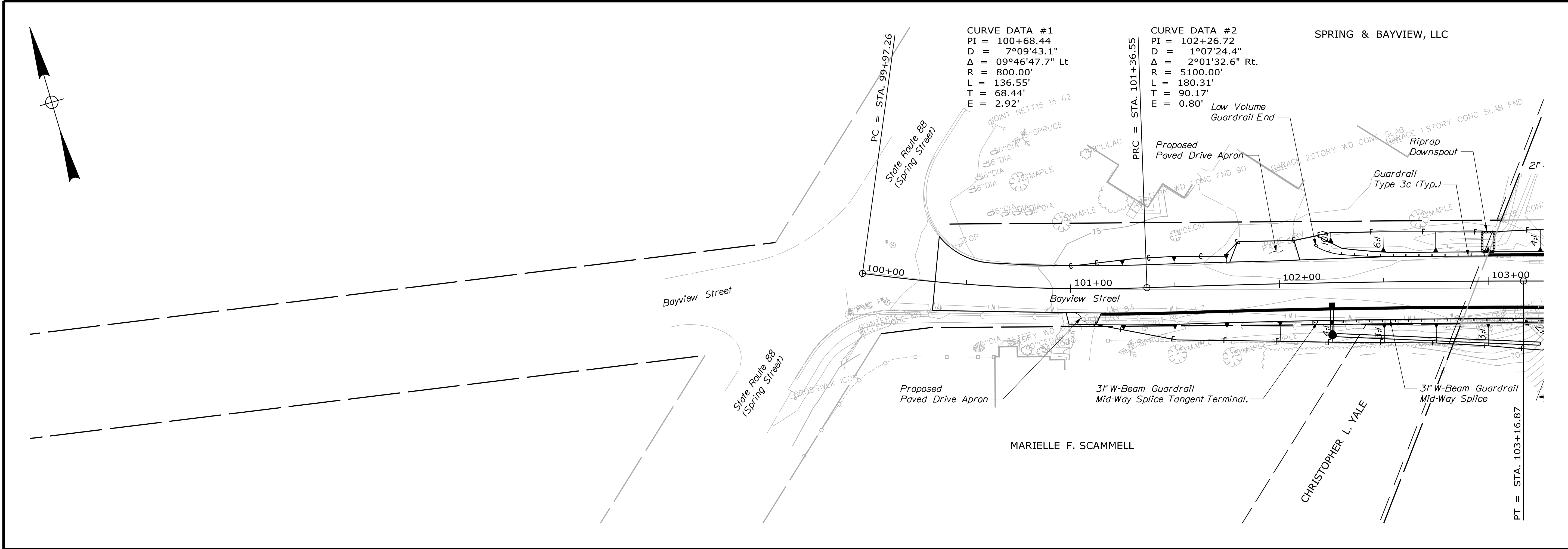
PROJECT INFORMATION	PROJECT COMPLETION DATE
PROGRAM PROJECT MANAGER DESIGNER CONSULTANT PROJECT RESIDENT CONTRACTOR	Bridge Joel Kittredge Steve Hodgdon Hoyle, Tanner & Assoc., Inc.    

Date:11/14/2018

Username:

Division: BRIDGE

Filename: ... \00\BRIDGE\MSTA002\_BDP\plan.dgn



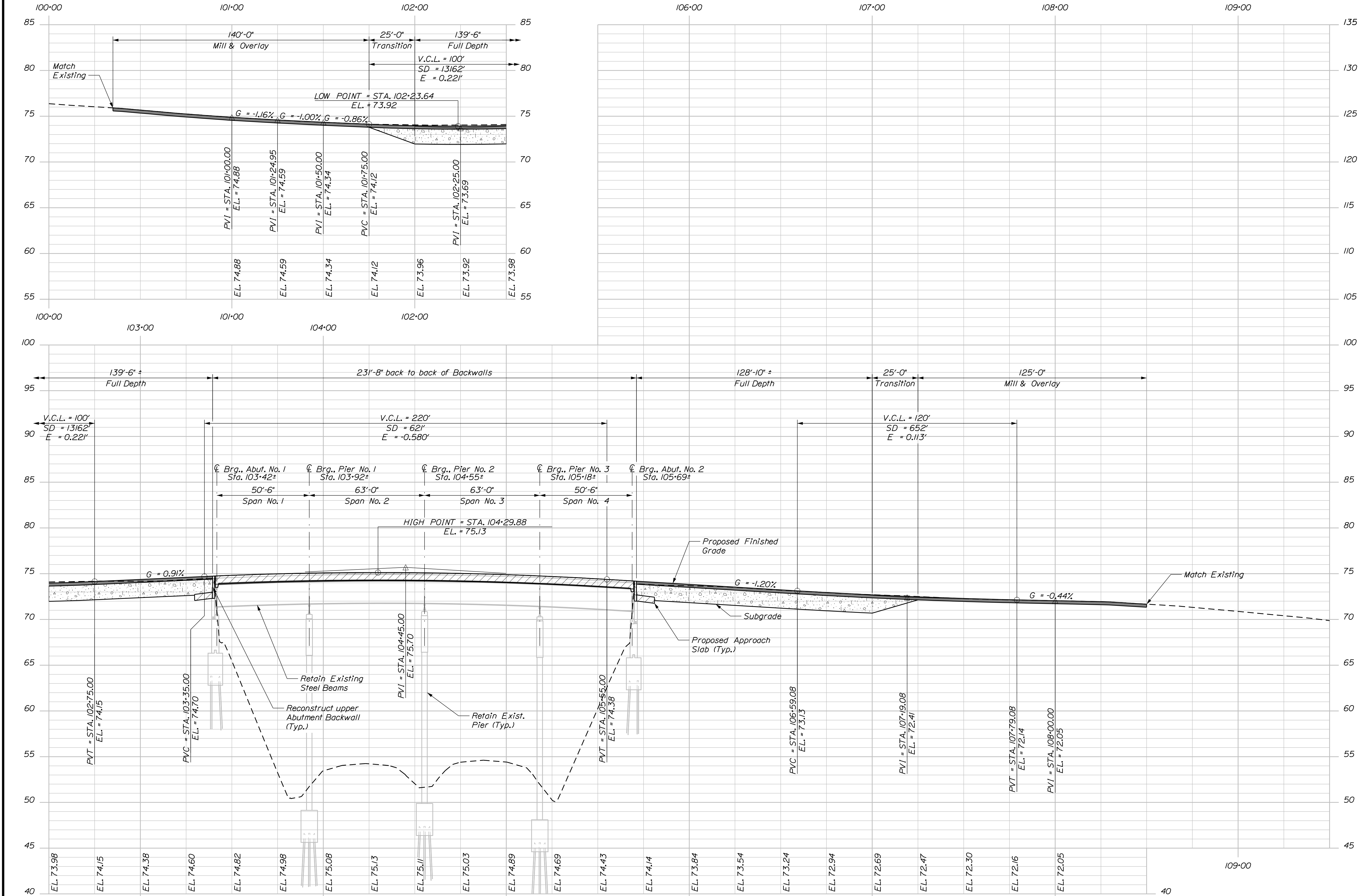
STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
2238000  
BRIDGE NO. 6835  
WIN  
22380.00  
BRIDGE PLANS

Hoyle, Tanner & Associates, Inc.

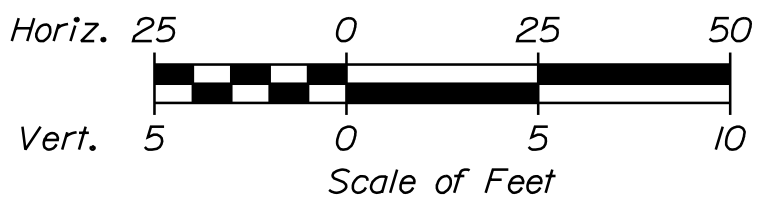
PROJ. MANAGER	J. Kirtledge	BY	B. Nichols	DATE	Nov. 2018
CHECKED-REVIEWED <td>S. Hodgdon<td>P. Dustin<td></td><td></td><td>Nov. 2018</td></td></td>	S. Hodgdon <td>P. Dustin<td></td><td></td><td>Nov. 2018</td></td>	P. Dustin <td></td> <td></td> <td>Nov. 2018</td>			Nov. 2018
DESIGNS-DETAILED					
DESIGNS-1					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

BAYVIEW STREET BRIDGE  
I-295  
CUMBERLAND COUNTY  
YARMOUTH  
PRELIMINARY PLAN

SHEET NUMBER  
2  
OF 6



PROFILE



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
2238000

**Hoyle, Tanner & Associates, Inc.**

PROJ. MANAGER	J. Kittredge	BY	B. Nichols	DATE	Nov. 2018
CHECKED	S. Hodgdon	DESIGNED	P. Dustin	DATE	Nov. 2018
DESIGNED		DESIGNED		DATE	
REVISIONS 1		REVISIONS 1		DATE	
REVISIONS 2		REVISIONS 2		DATE	
REVISIONS 3		REVISIONS 3		DATE	
REVISIONS 4		REVISIONS 4		DATE	
FIELD CHANGES					

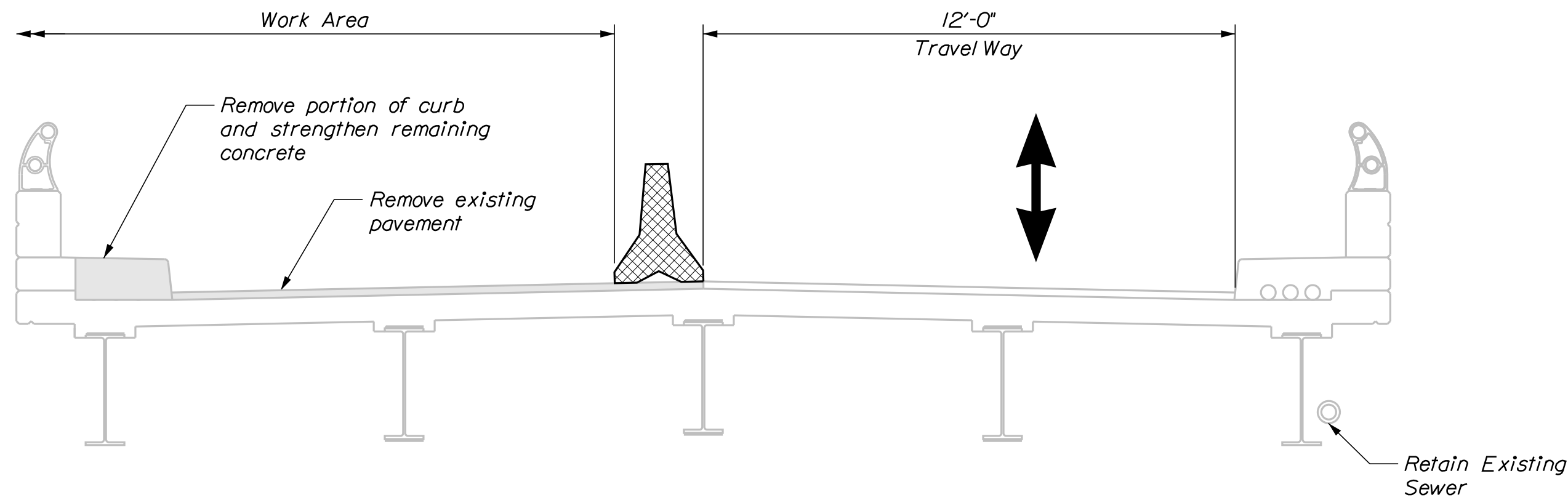
BAYVIEW STREET BRIDGE  
1-295  
YARMOUTH CUMBERLAND COUNTY

PRELIMINARY PROFILE

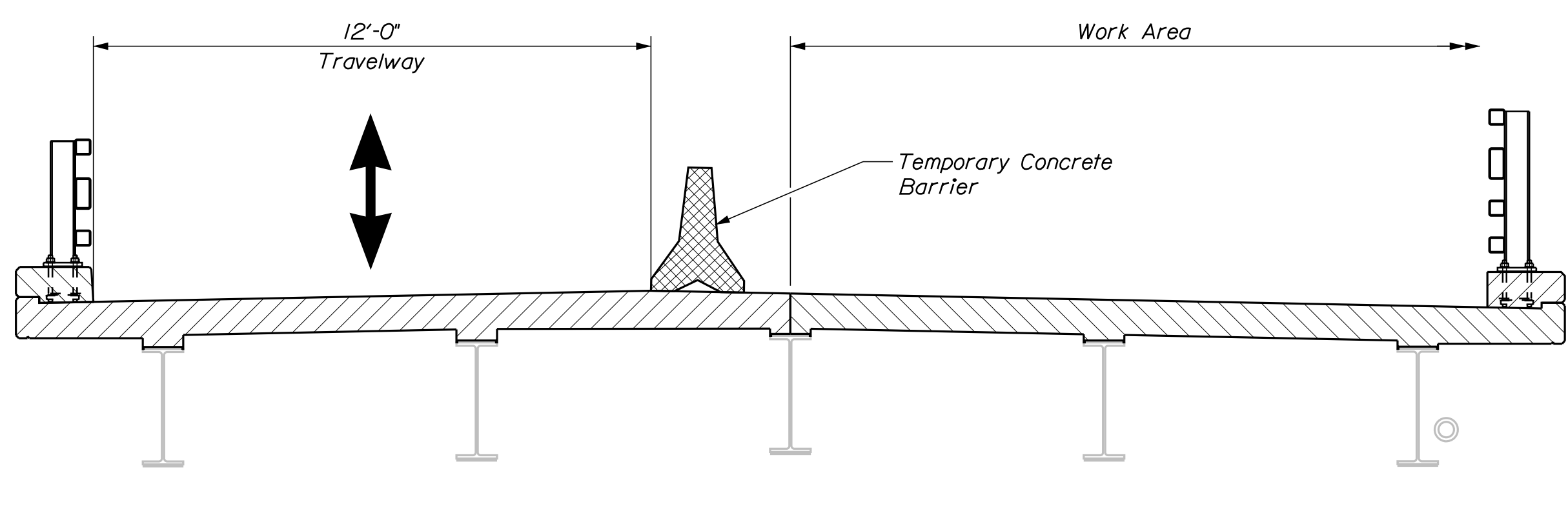
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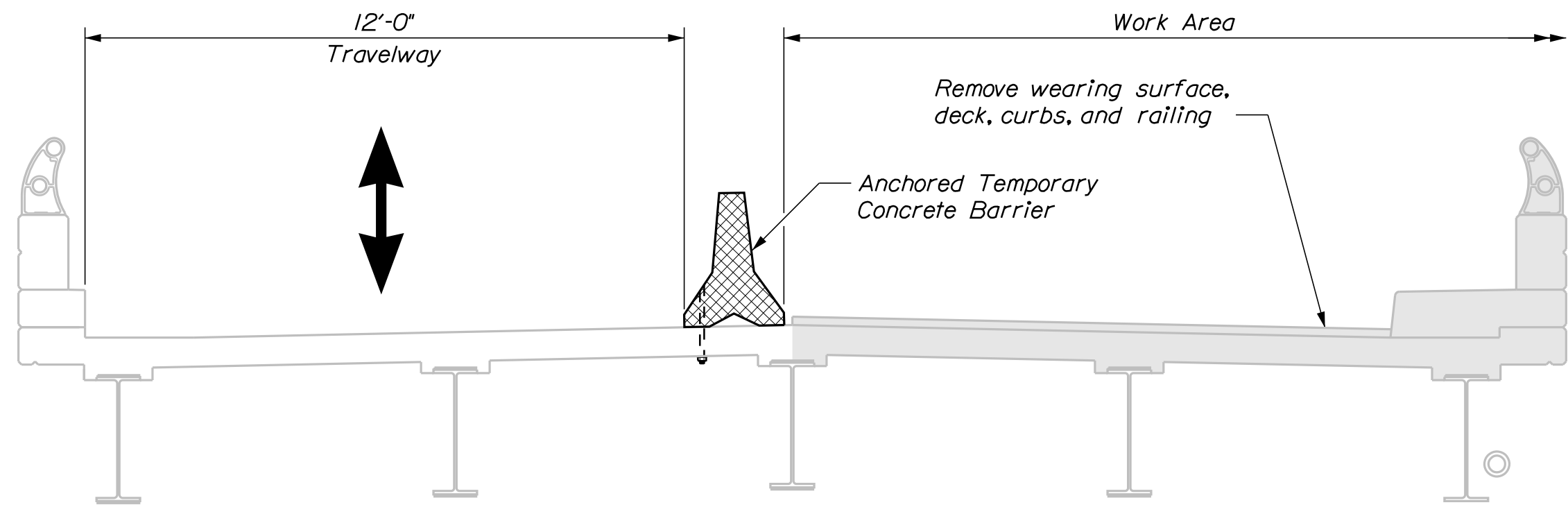
OF 6



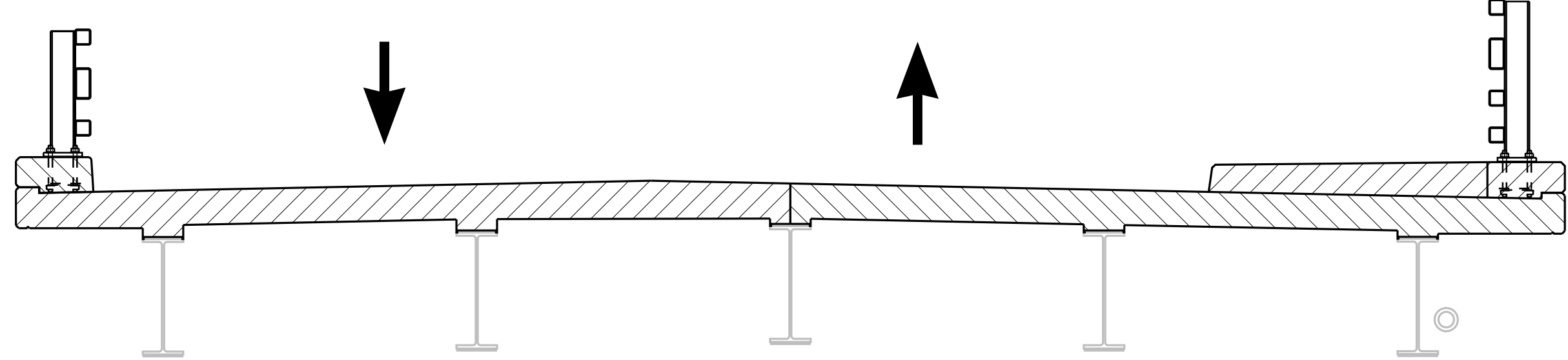
STAGE IA



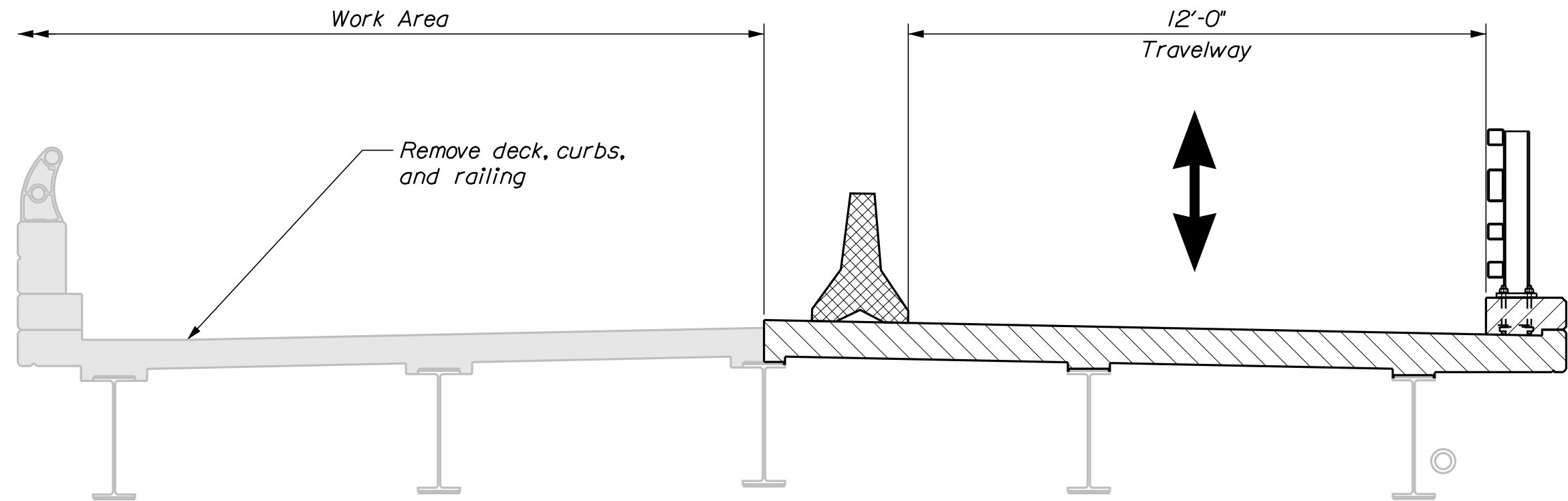
STAGE III



STAGE IB



STAGE IV



STAGE II

**LEGEND**  
 Cast-in-Place Concrete  
 Existing Concrete to be removed

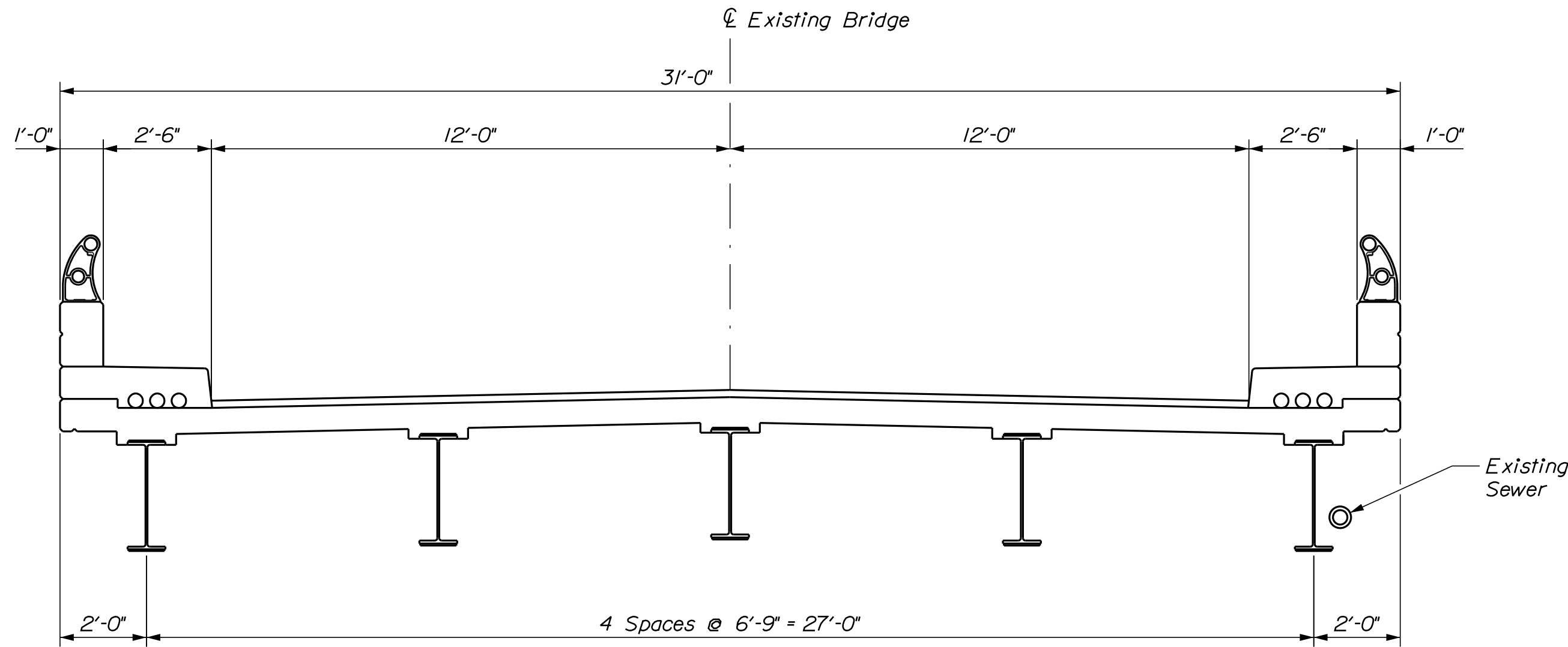
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2238000  
WIN  
22380.00  
BRIDGE NO. 6835  
BRIDGE PLANS

Hoyle, Tanner & Associates, Inc.

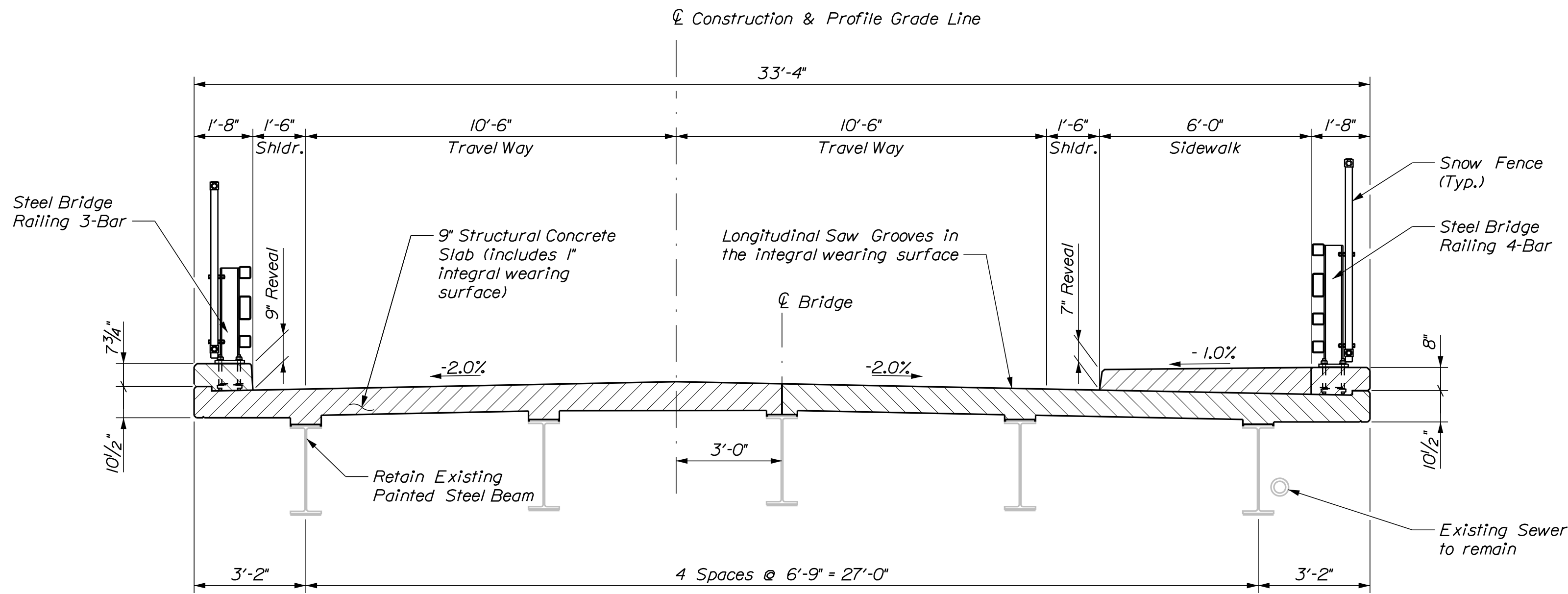
PROJECT: BAYVIEW STREET BRIDGE  
1-295  
CUMBERLAND COUNTY  
YARMOUTH  
STAGED CONSTRUCTION

SHEET NUMBER  
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OF 6

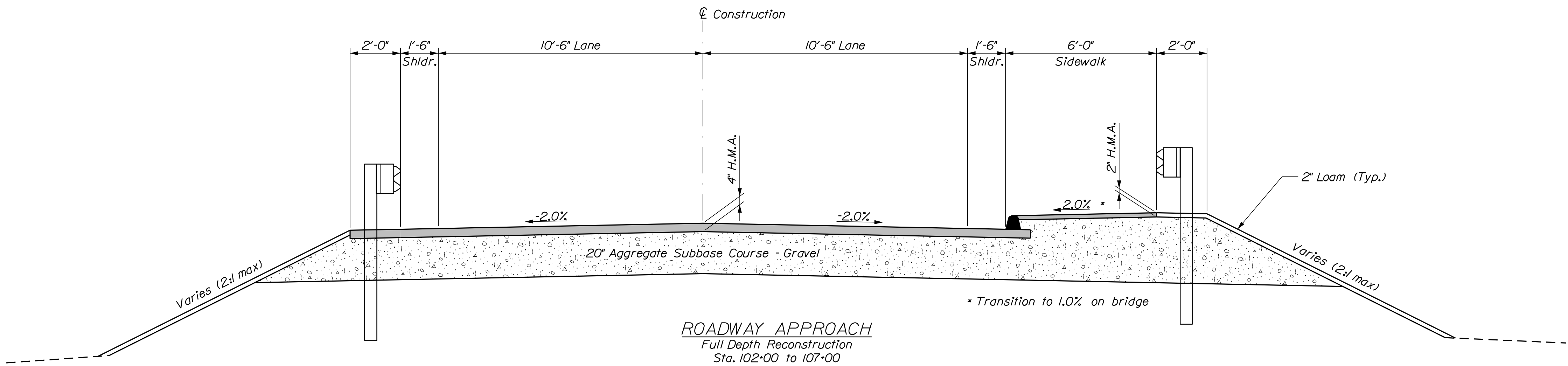
PROJ. MANAGER	J. Kittredge	BY	DATE
DESIGN-DETAILED	S. Hodgdon	B. Nichols	Nov. 2018
CHECKED-REVIEWED		P. Dustin	Nov. 2018
DESIGN-DETAILED			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			



EXISTING TRANSVERSE SECTION



PROPOSED BRIDGE SECTION



ROADWAY APPROACH  
Full Depth Reconstruction  
Sta. 102+00 to 107+00

STATE OF MAINE DEPARTMENT OF TRANSPORTATION	2238000		BRIDGE NO. 6635 WIN 22380.00 BRIDGE PLANS
	2238000		
Hoyle, Tanner & Associates, Inc.			
BAYVIEW STREET BRIDGE 1-295 YARMOUTH CUMBERLAND COUNTY		TYPICAL SECTIONS	
SHEET NUMBER		5	
OF 6			

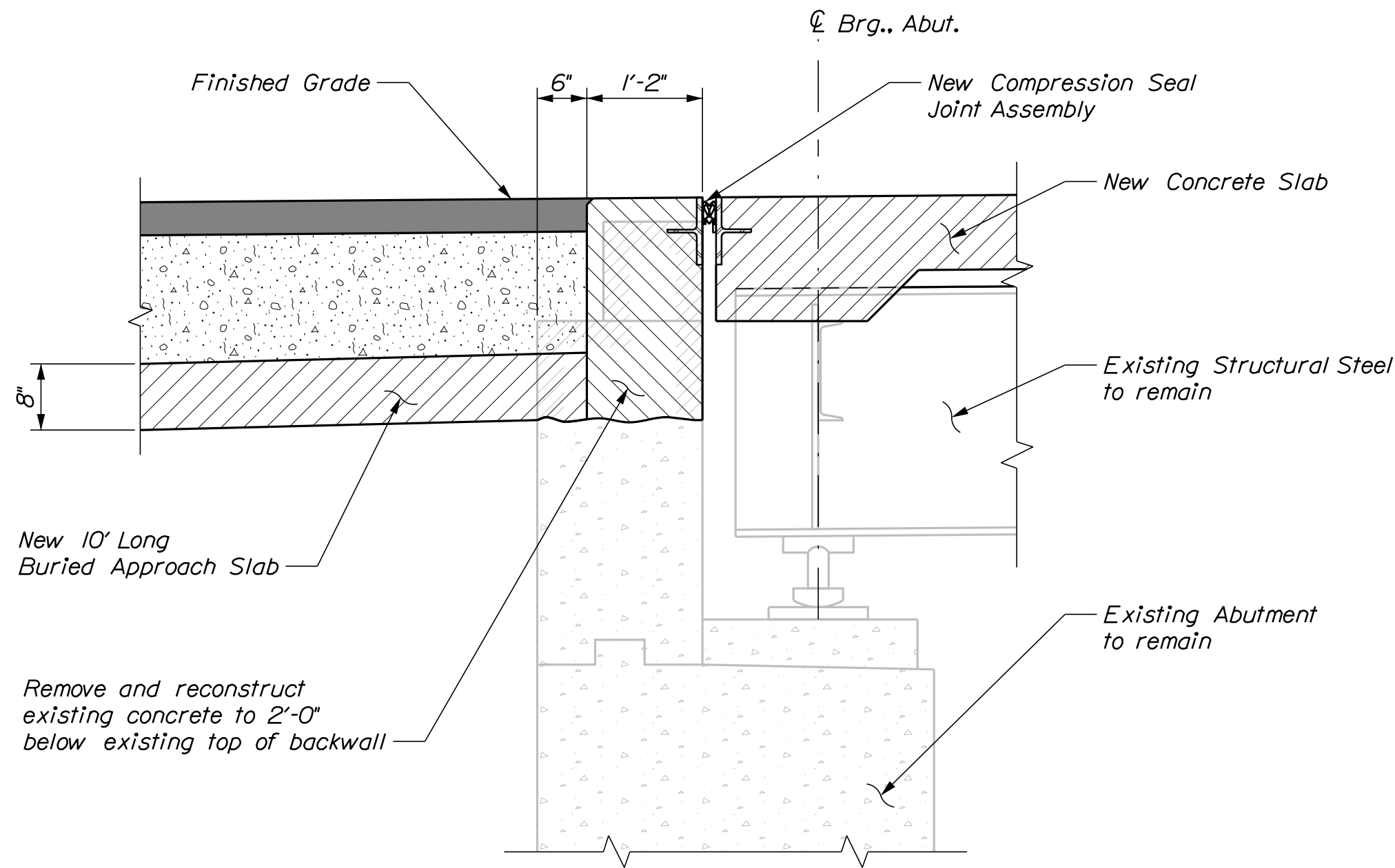


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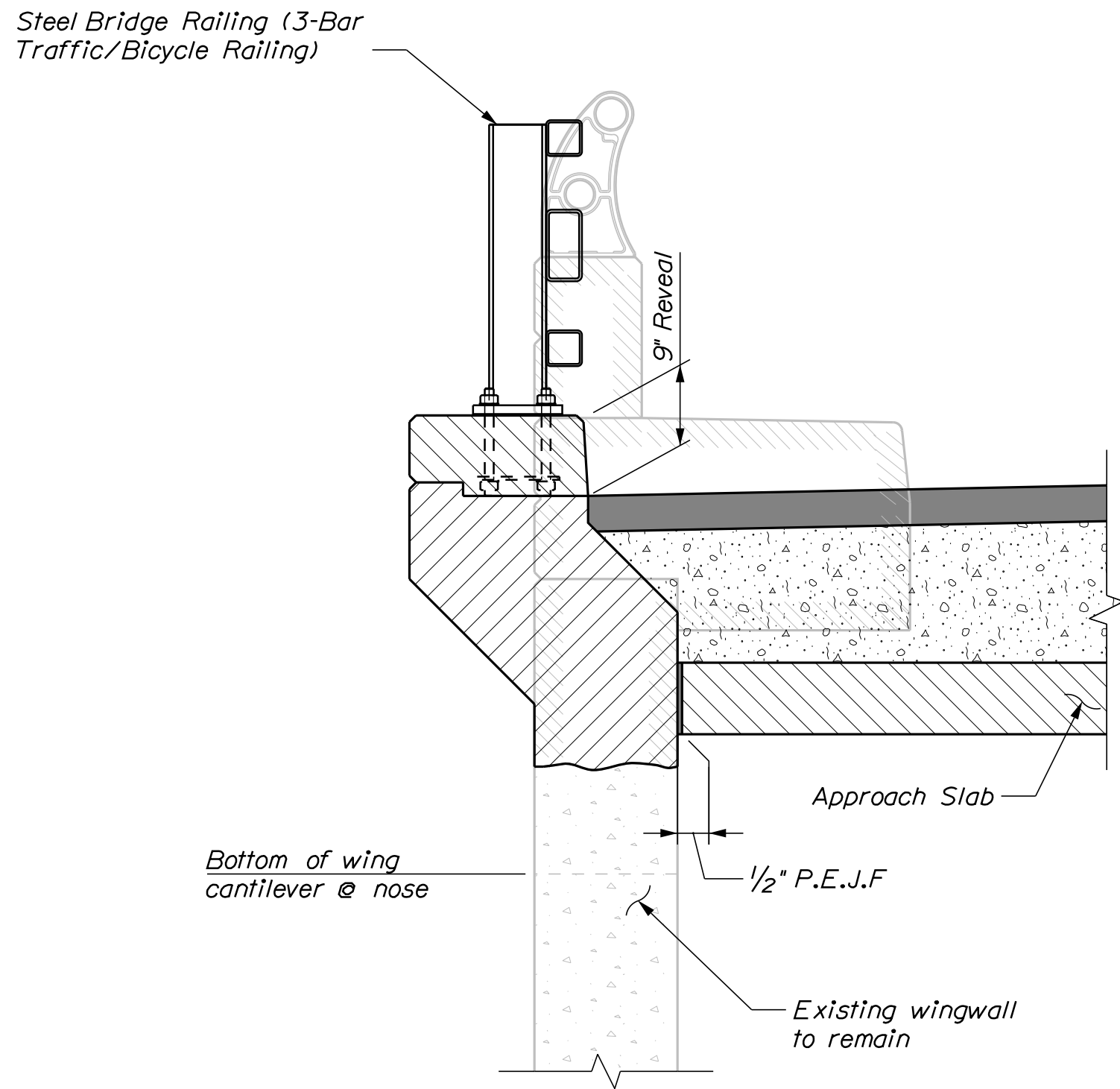
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Division: BRIDGE

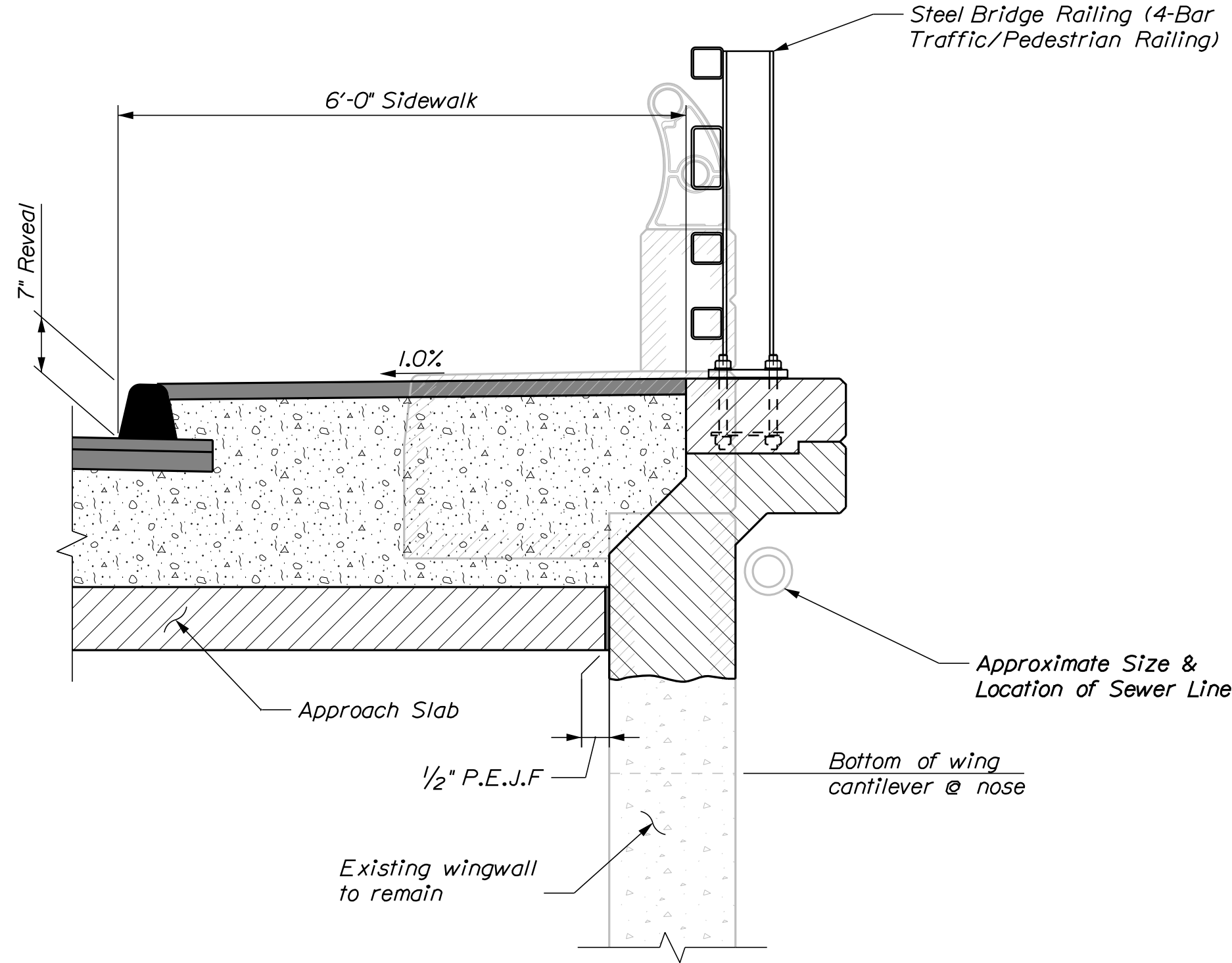
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BACKWALL SECTION  
(Abutment No. 1 shown - Abutment No. 2 Similar)




NORTHERLY WINGWALL SECTION



SOUTHERLY WINGWALL SECTION

BAYVIEW STREET BRIDGE I-295 YARMOUTH CUMBERLAND COUNTY				PROJ. MANAGER J. Kittredge		BY B. Nichols	DATE Nov. 2018
ABUTMENT DETAILS				DESIGN-DETAILED		S. Haddon	
				CHECKED-REVIEWED		P. Dustin	Nov. 2018
				DESIGN2-DETAILED2			
				DESIGN3-DETAILED3			
				REVISIONS 1			
				REVISIONS 2			
				REVISIONS 3			
				REVISIONS 4			
				FIELD CHANGES			

STATE OF MAINE DEPARTMENT OF TRANSPORTATION				BRIDGE NO. 5835		BRIDGE PLANS	
2238000				WIN 22380.00			

SHEET NUMBER		6	
		OF 6	

# Appendix B

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## Photographs



Photo #1: Southerly Elevation (June 2017)



Photo #2: West Approach looking west (November 2017)





Photo #3: East Approach looking east (November 2017)



Photo #4: Looking west along bridge (April 2018)



Photo #5: Localized damage to slope paving at abutments (April 2018)



Photo #6: Span 2 deck underside (April 2018)





Photo #7: Abutment 1 shoe (April 2018)



Photo #8: Pier 1 with close guardrail (looking north) (April 2018)



Photo #9: Pier 2 looking east (April 2018)



Photo #10: Pier 3 north column crack and delamination area (April 2018)



Photo #11: Abutment 1 wingwall (April 2018)



Photo #12: Abutment 2 wingwall (April 2018)





Photo #13: Intersection of Old Shipyard Road (April 2018)



Photo #14: East approach looking west (April 2018)



Photo #15: West limit of project near Spring Street (April 2018)



Photo #16: Limit of existing sidewalk at west approach (April 2018)





Photo #17: Pavement and curbing at Old Shipyard Road (April 2018)



Photo #18: Sewer manhole at SW quadrant (April 2018)





Photo #19: Drive and drainage at northwest quadrant (April 2018)



Photo #20: Low area and pavement failure at west approach (April 2018)



Photo #21: Utility pole at west approach (April 2018)



Photo #22: Utility pole at east approach on outside of curve (April 2018)





Photo #23: Swale at NW quadrant looking east (April 2018)



Photo #24: Boulder retaining wall at NE quadrant (April 2018)

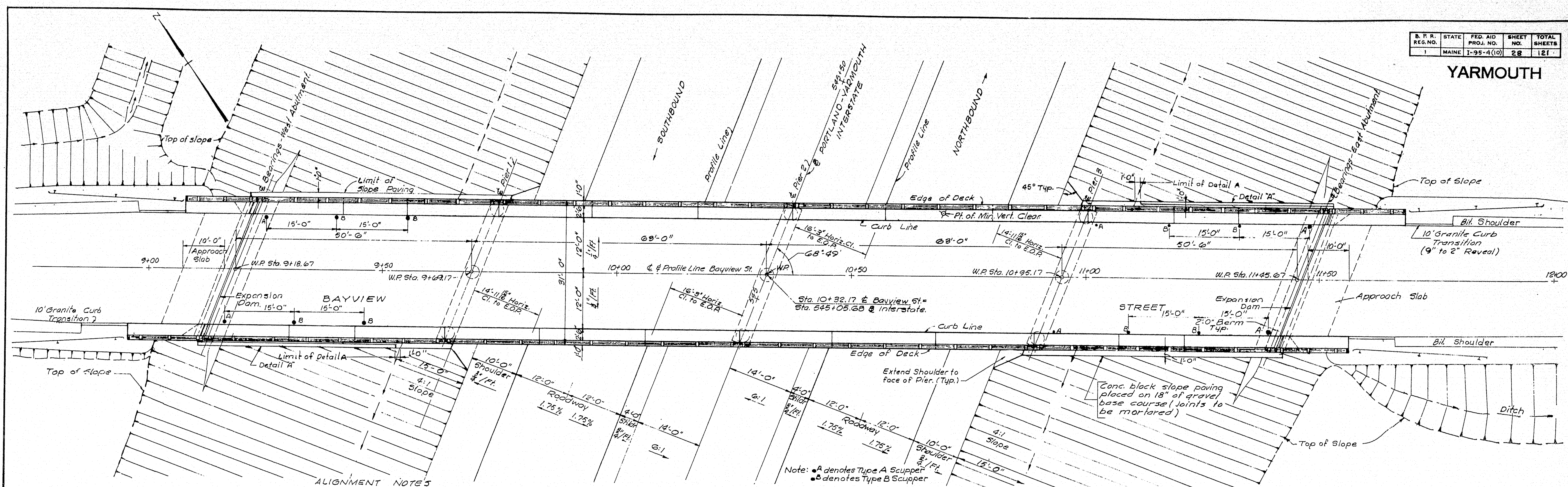
# Appendix D

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## Existing Bridge Plans

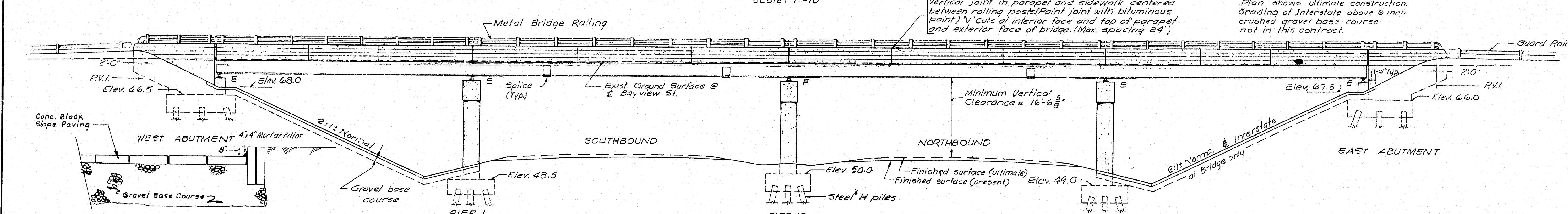


# YARMOUTH



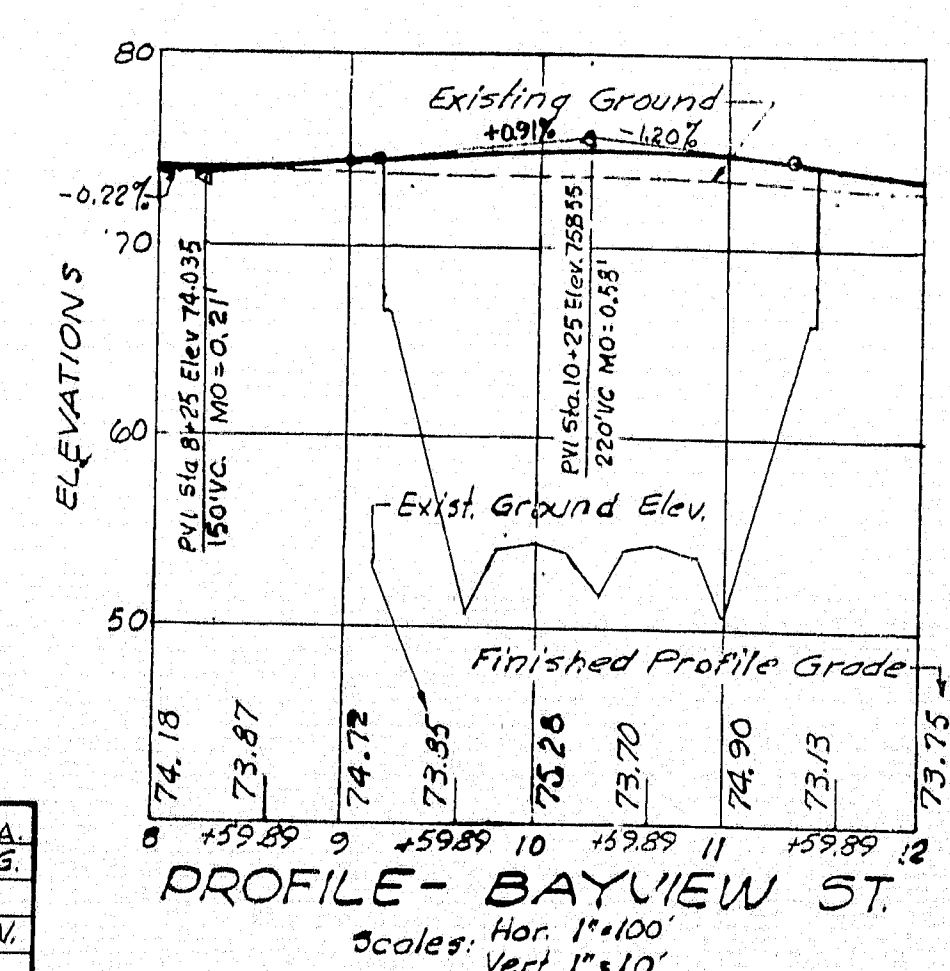
**ALIGNMENT NOTES**  
 1) Abutment and Piers are parallel to Interstate  
 2) Wingwalls and Stringers are parallel to Bayview St.

**PLAN**  
 Scale: 1"=10'

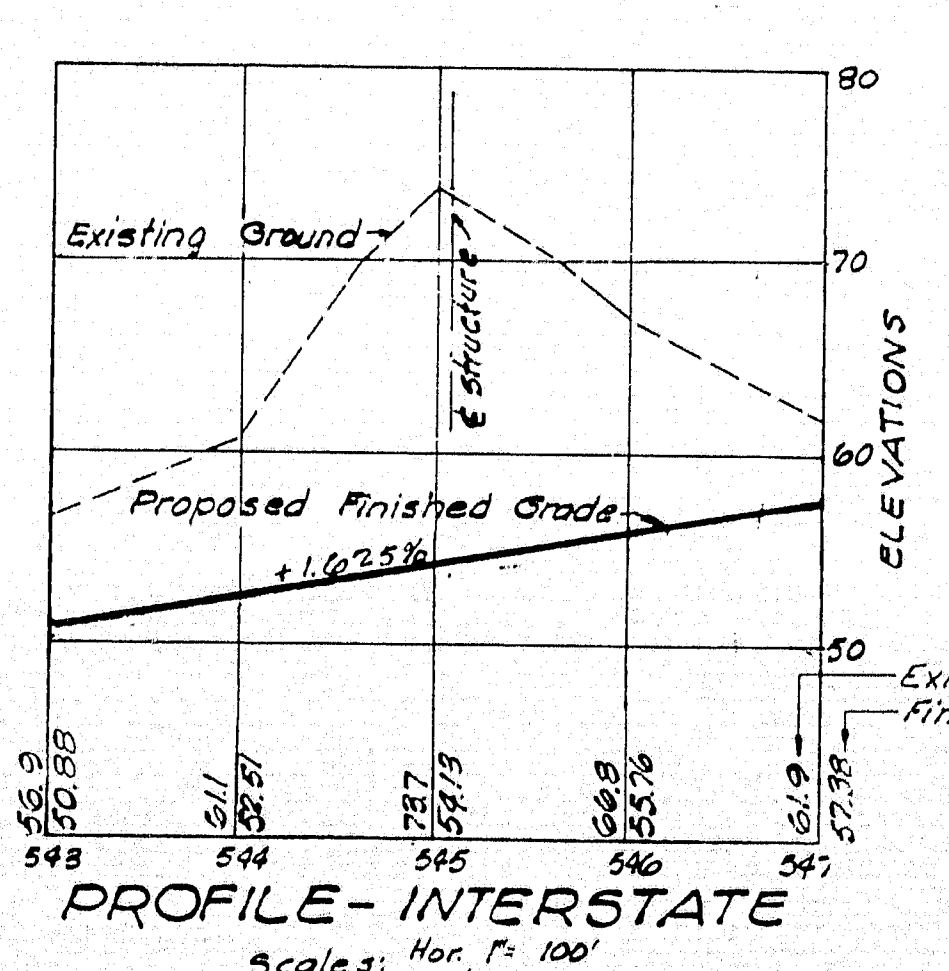


**ELEVATION**  
 Scale: 1"=10'

**DETAIL A**  
 Scale: 1/2"=1'-0"



**PROFILE - BAYVIEW ST.**  
 Scale: Hor. 1"=100', Vert. 1"=10'



**PROFILE - INTERSTATE**  
 Scale: Hor. 1"=100', Vert. 1"=10'

## GENERAL NOTES

- SPECIFICATIONS:**  
 A.A.S.H.O. 1953  
 Maine State Highway Commission, Standard Specifications and Special Provisions
- LIVE LOAD:**  
 H20-44
- FOUNDATIONS:**  
 Steel H piles driven to firm end bearing  
 Design Capacity of piles - 357 tons
- ALLOWABLE STRESSES:**  
 Structural Steel - 18,000 p.s.i.  
 Reinforcing Steel - 18,000 p.s.i.  
 Concrete - 1,200 p.s.i.
- CONCRETE:**  
 Class 'A' - Footings, Piers, Abutments, Approach Slabs and Deck
- ELEVATIONS:**  
 Based on Elev. 0.00 at Mean Sea Level

ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
304-12	Structural Earth Excavation - Abuts. and Ret. Walls	C.Y.	320
304-14	Structural Earth Excavation - Piers	C.Y.	320
302-7	Gravel Base Course - In Place Measurement	C.Y.	225
307-5	Reinforced Portland Cement Concrete Approach Slabs	S.Y.	33
404-28	Bituminous Concrete Surface Course, Type A	Ton	80
701-33	Portland Cement Concrete, Abutments and Ret. Walls	C.Y.	218
701-37	Portland Cement Concrete, Substructure Columns, Col. Bases, Bents, Collision Walls, Girders, Struts, Etc.	C.Y.	190
701-40	Portland Cement Concrete, Roadway and Sidewalk Slabs on Steel Bridges	C.Y.	255
701-47	Portland Cement	Bbl.	295
701-51	Metal Roadway Scurpers	Each	14
702-103	Structural Steel, Fabricated and Delivered	Lb.	165,000
702-104	Structural Steel, Erection	Lb.	165,000
702-105	Structural Steel, Field Painting	Lb.	165,000
705-13	Reinforcing Steel, Delivered	Lb.	86,000
705-14	Reinforcing Steel, Placing	Lb.	86,000
708-16	Steel H-beam Piles 42 lbs. per ft.	L.F.	6,777
807-9	Membrane Waterproofing	S.Y.	670
710-6	Waterproofing Joints	L.F.	30
804-6	French Drains	C.Y.	351
806-7	Minimum Rail, Delivered and Erected	L.F.	322
808-6	Slope Paving for Bridges	S.Y.	420

\* Includes 270 L.F. allowance for Pile Bearing Plates and 70 L.F. allowance for Pile Splices.

STATE HIGHWAY COMMISSION  
 AUGUSTA, MAINE

PORTLAND-YARMOUTH INTERSTATE

**BAYVIEW STREET OVER INTERSTATE**

**GENERAL PLAN AND ELEVATION**

SHEET NO. 28 OF 121    SCALE: AS NOTED

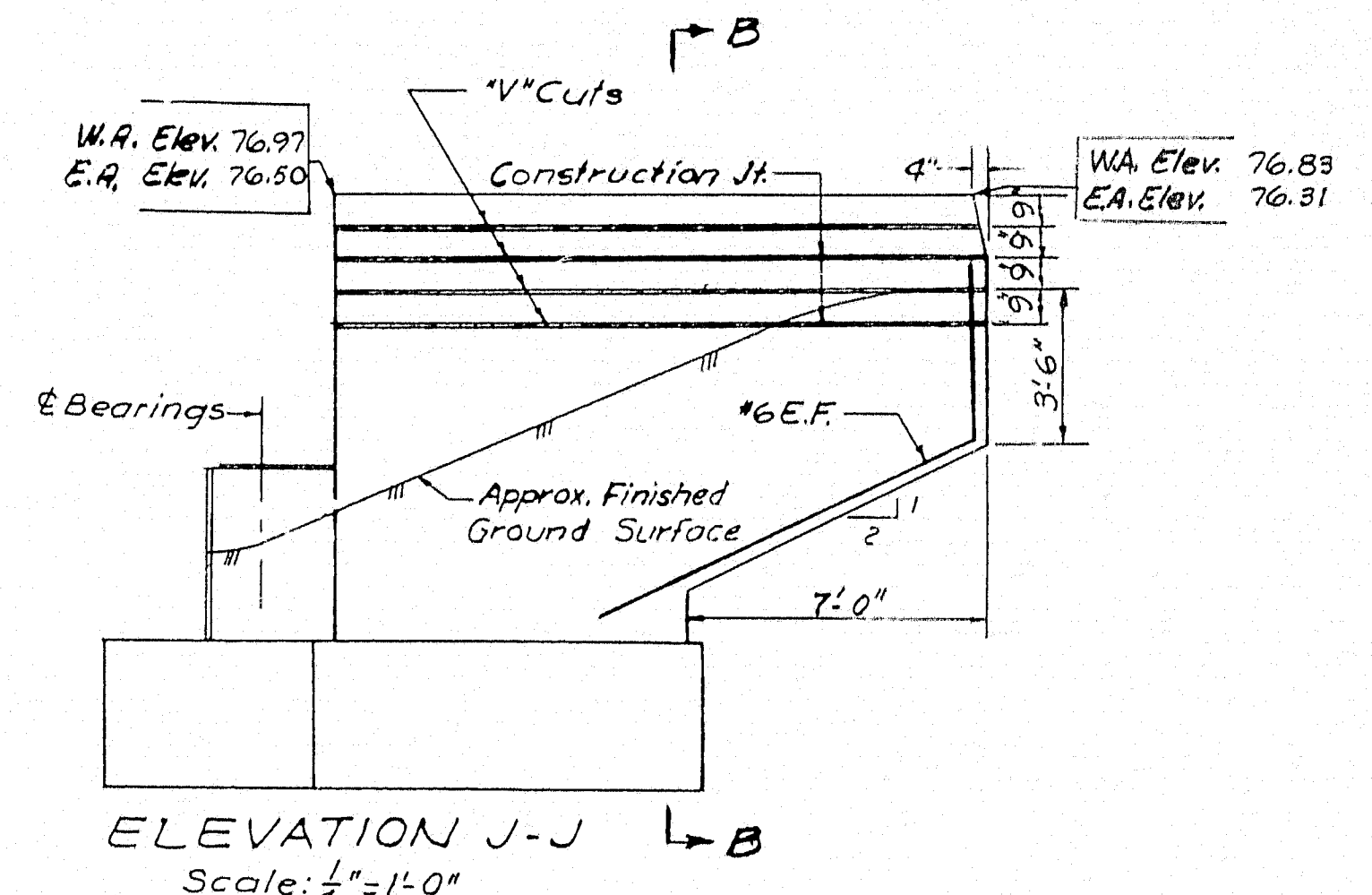
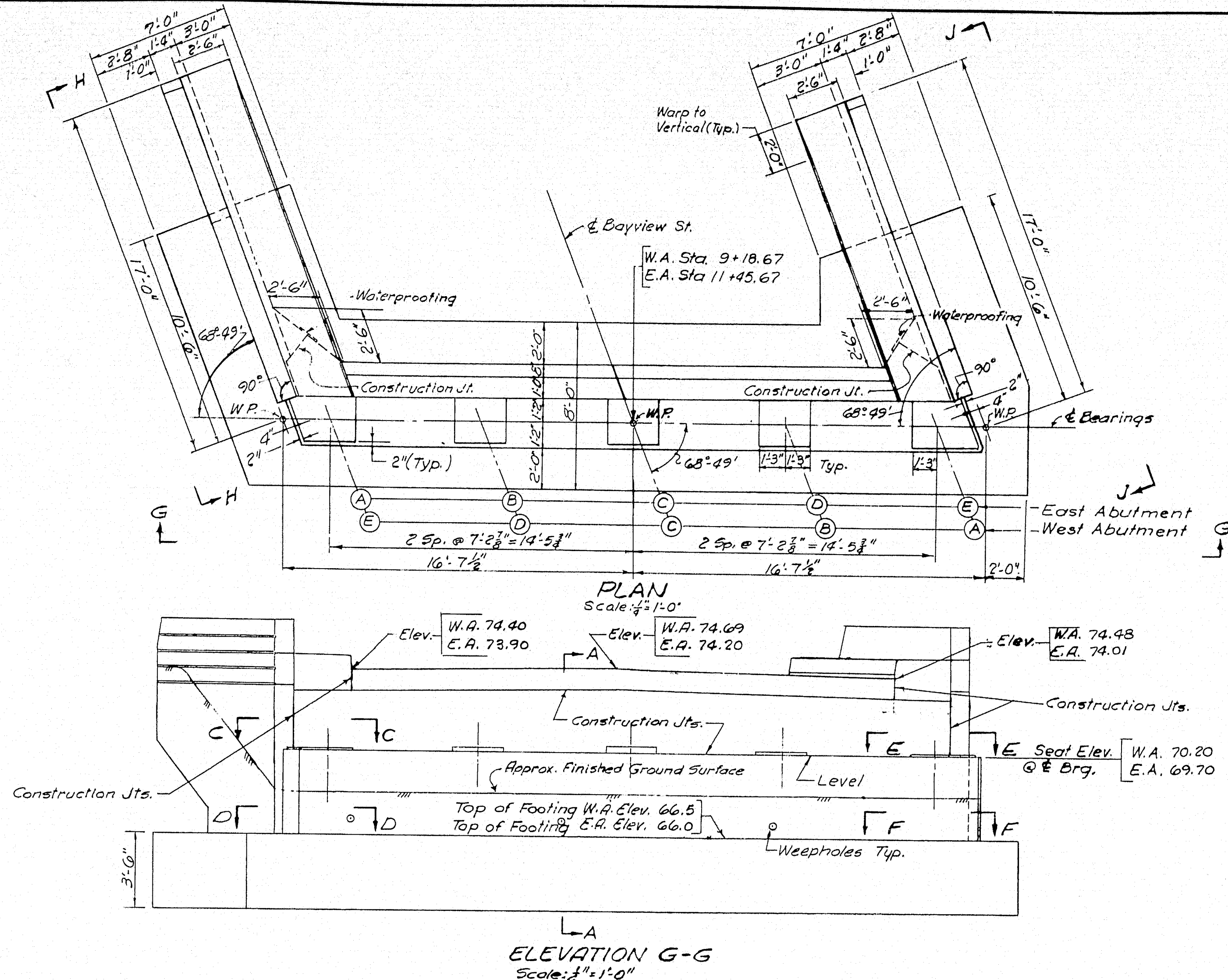
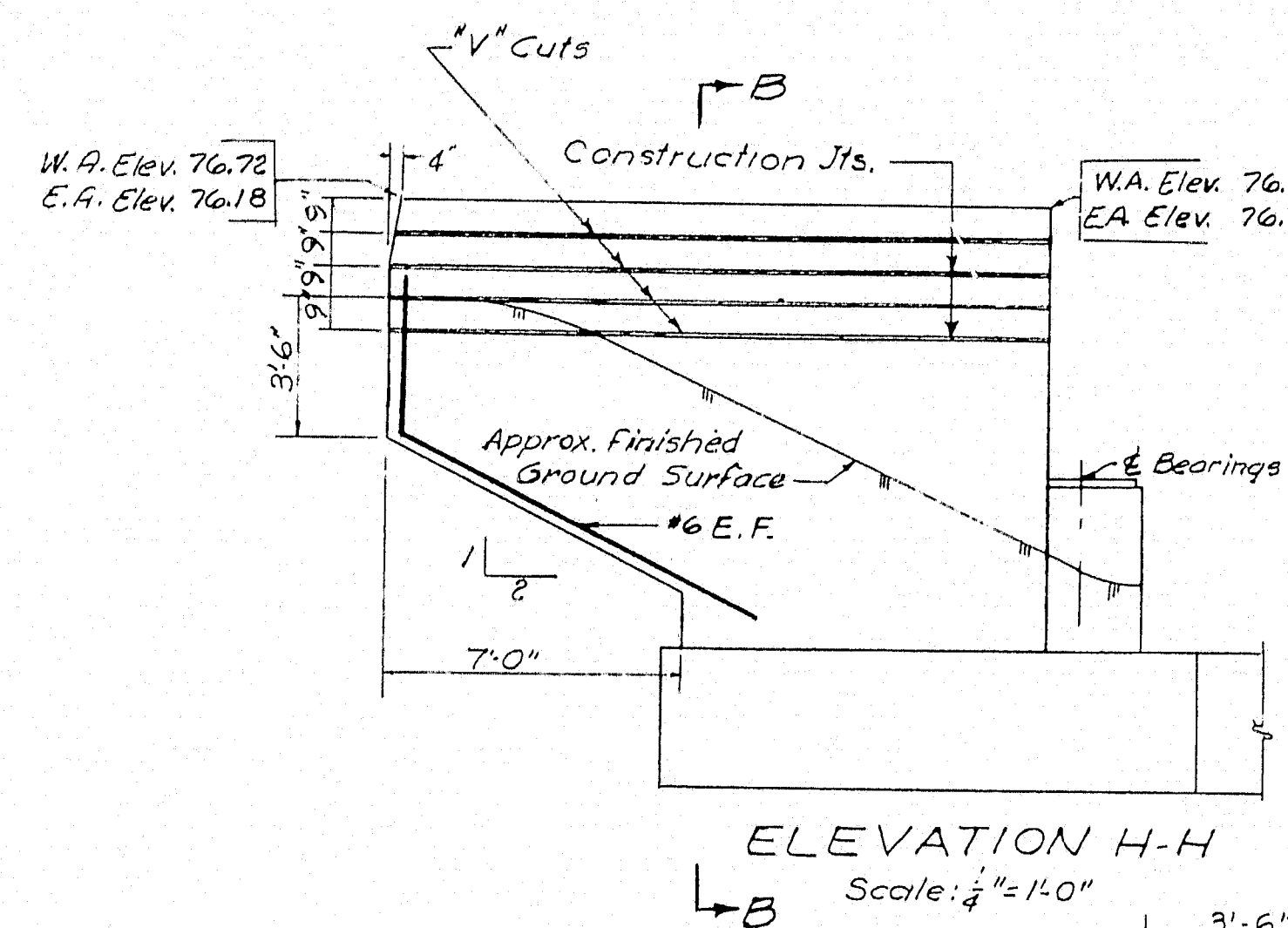
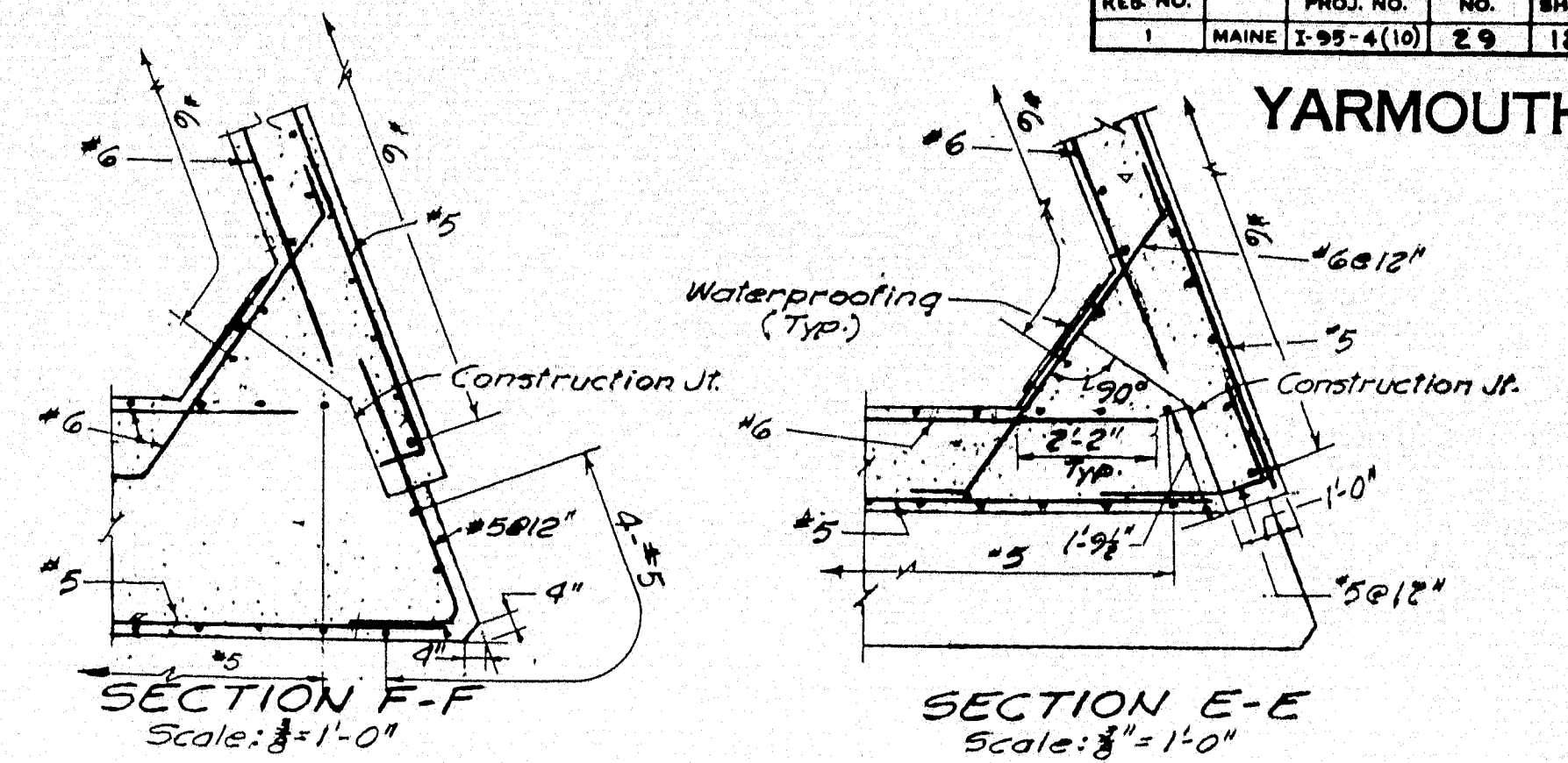
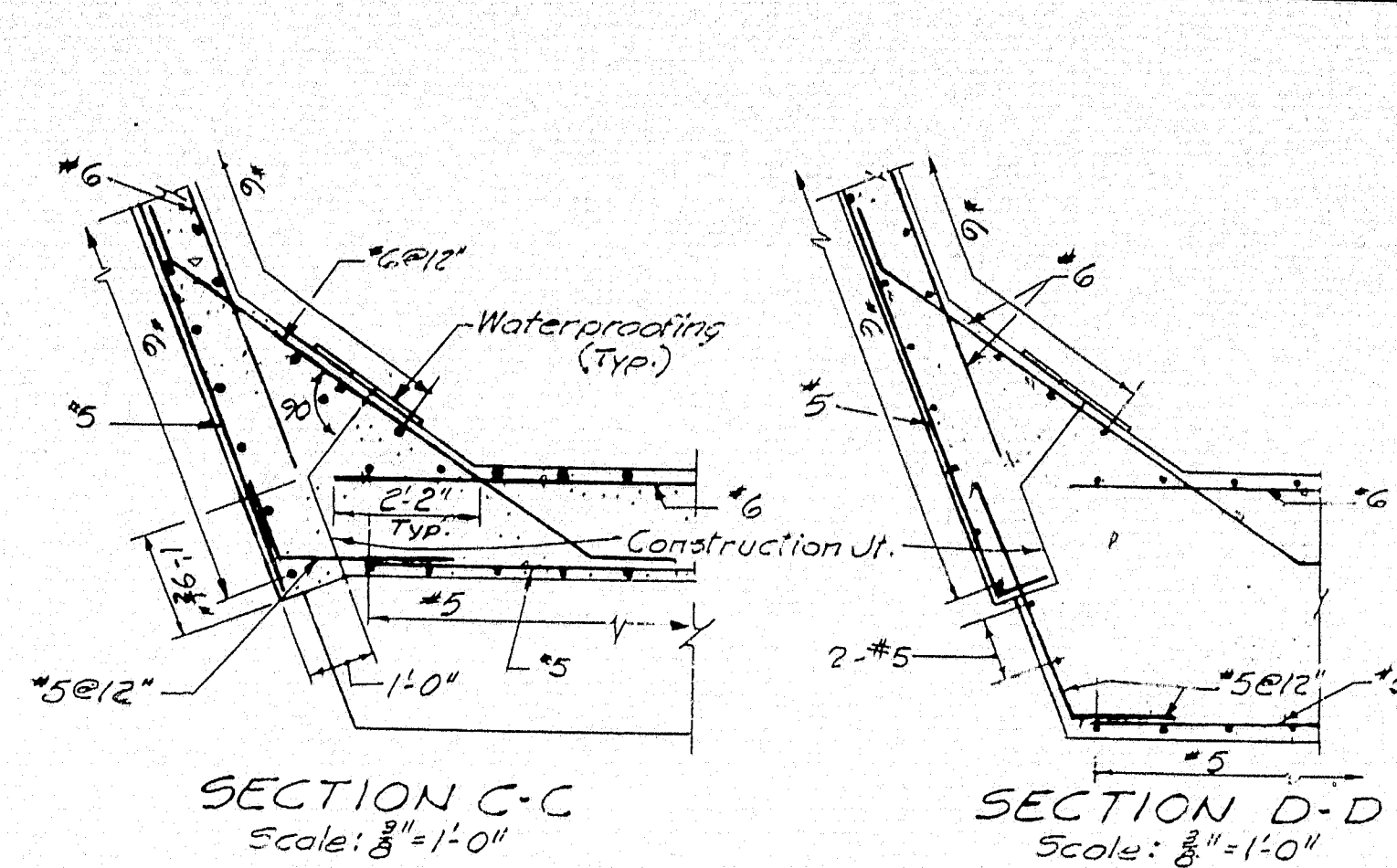
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 ENGINEERS    BOSTON, MASS.

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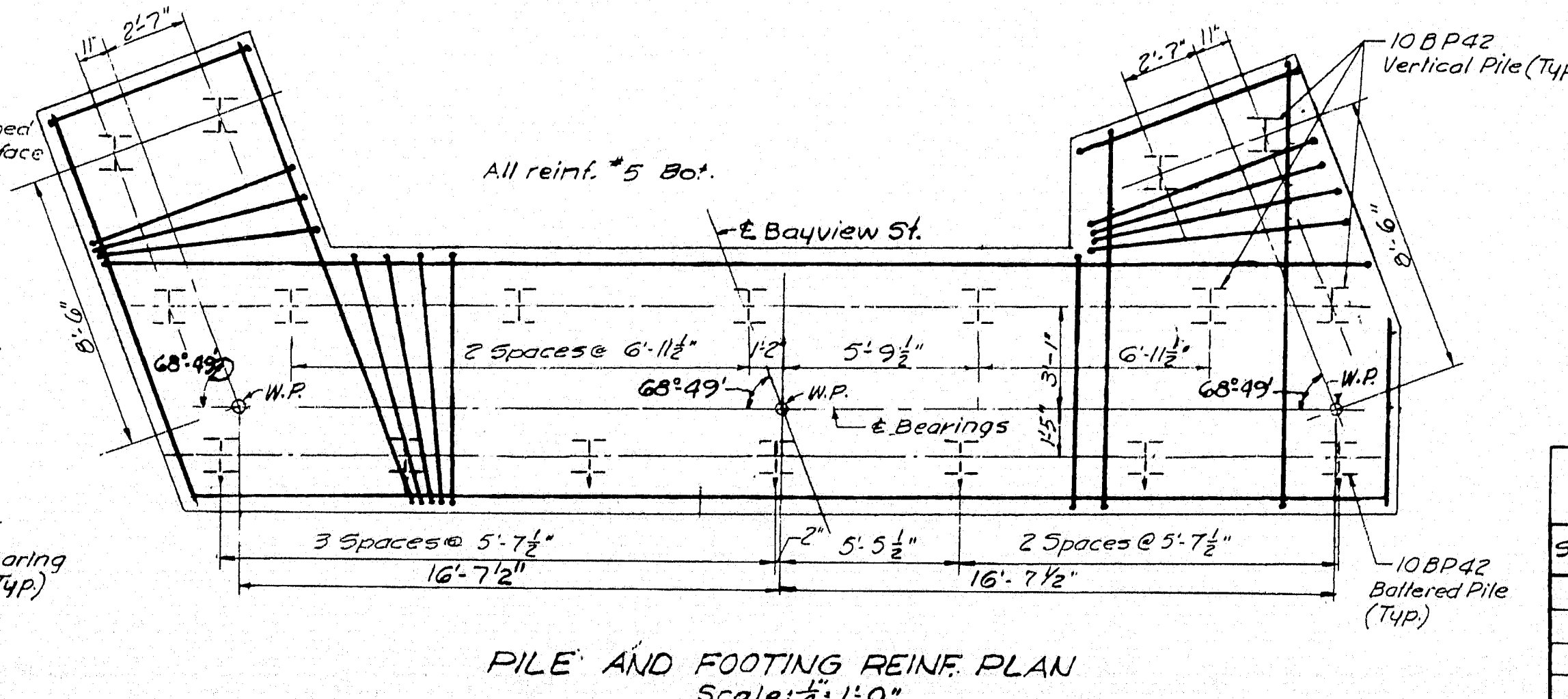
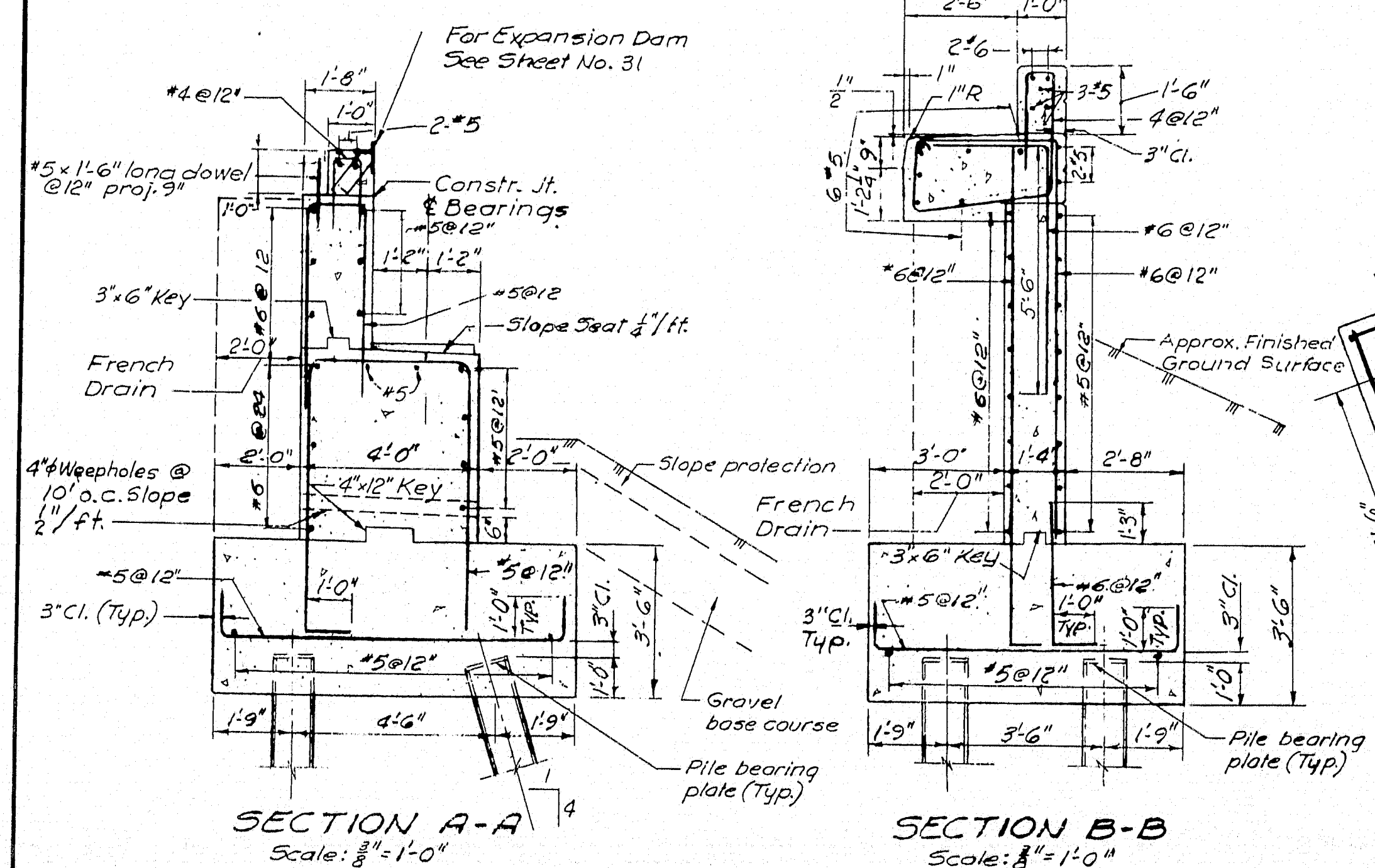


# YARMOUTH



**NOTES:**  
For Typical details see Sheet No. 30  
For construction notes see Sheet No. 30

**LEGEND**  
W.A. - West Abutment  
E.A. - East Abutment  
W.P. - Working Point  
E.F. - Each Face



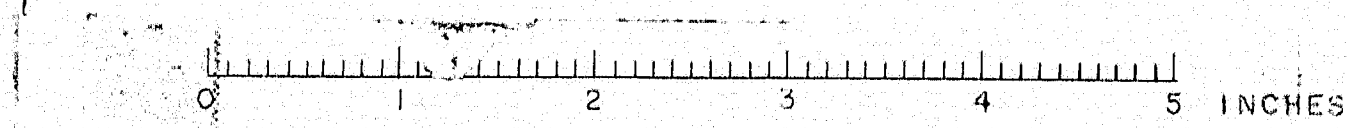
BEARING PAD ELEVATIONS		
STRINGER	WEST ABUTMENT	EAST ABUTMENT
A	70.46	69.87
B	70.56	70.03
C	70.68	70.20
D	70.52	70.09
E	70.37	70.00

STATE HIGHWAY COMMISSION AUGUSTA, MAINE		
PORTLAND-YARMOUTH INTERSTATE		
BAYVIEW STREET OVER INTERSTATE		
ABUTMENT DETAILS		
SHEET NO. 29 OF 121	SCALE: AS NOTED	

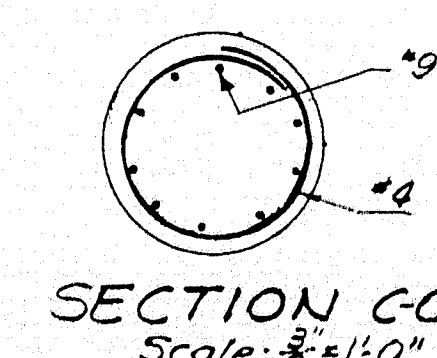
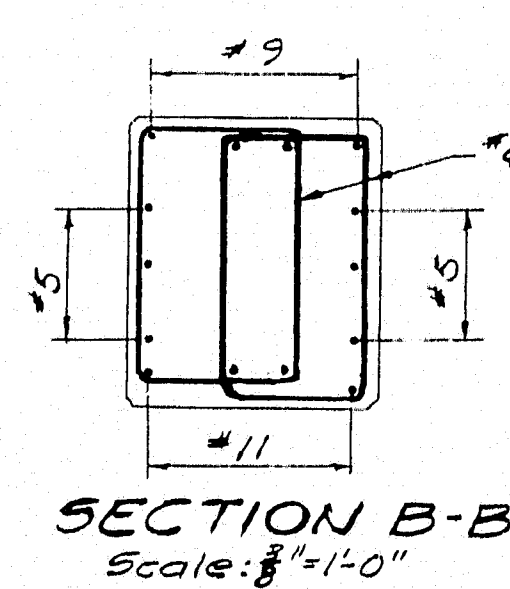
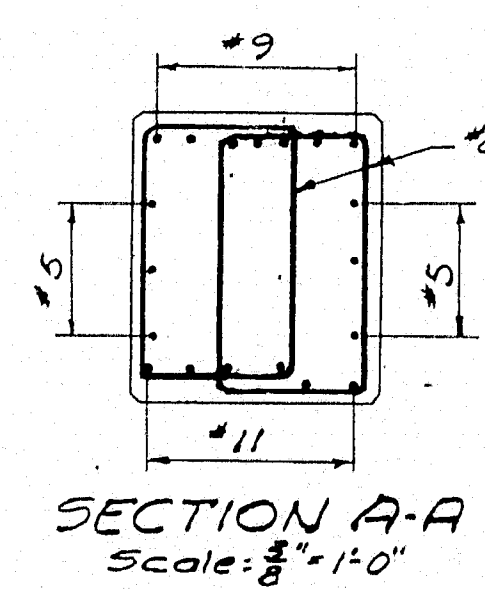
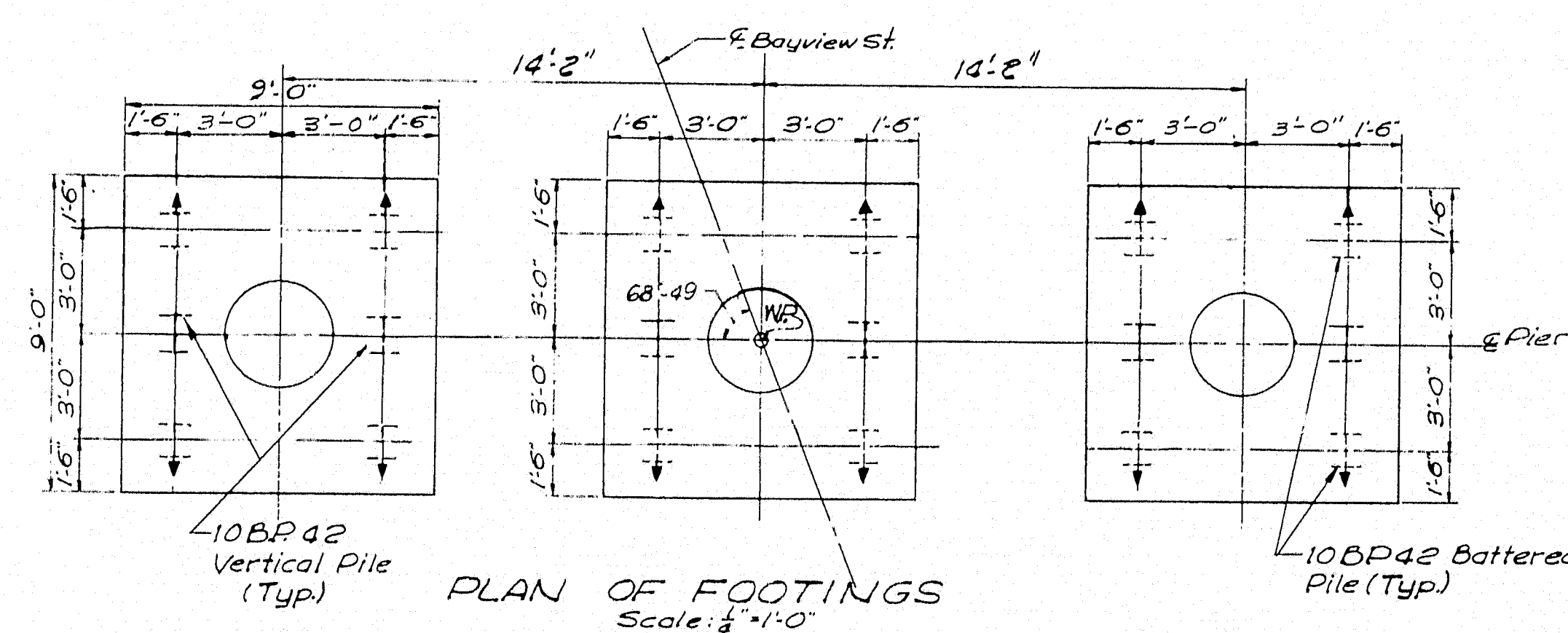
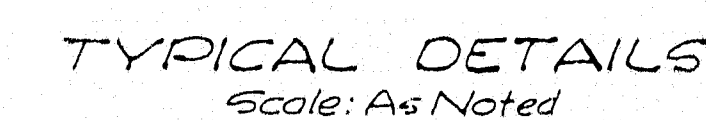
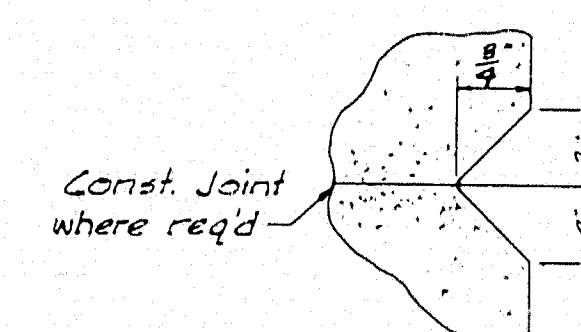
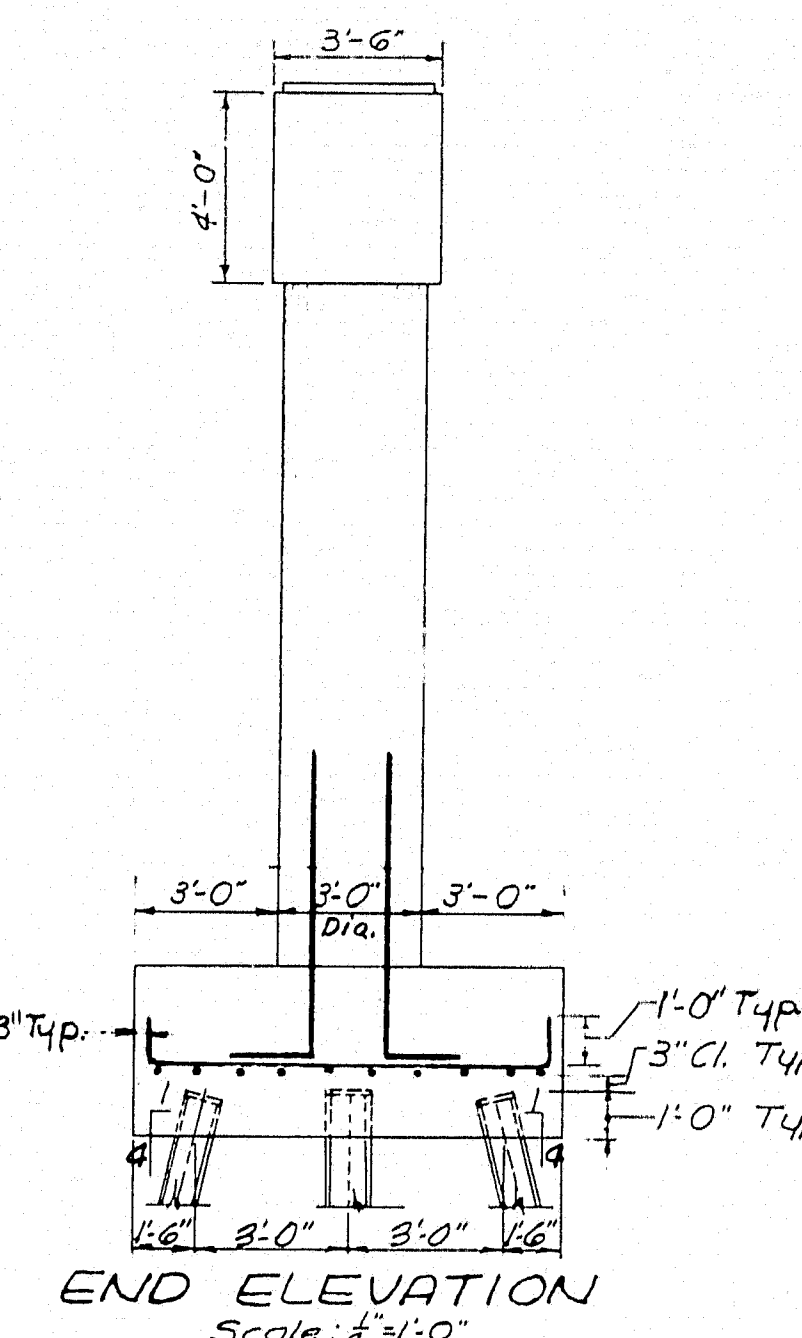
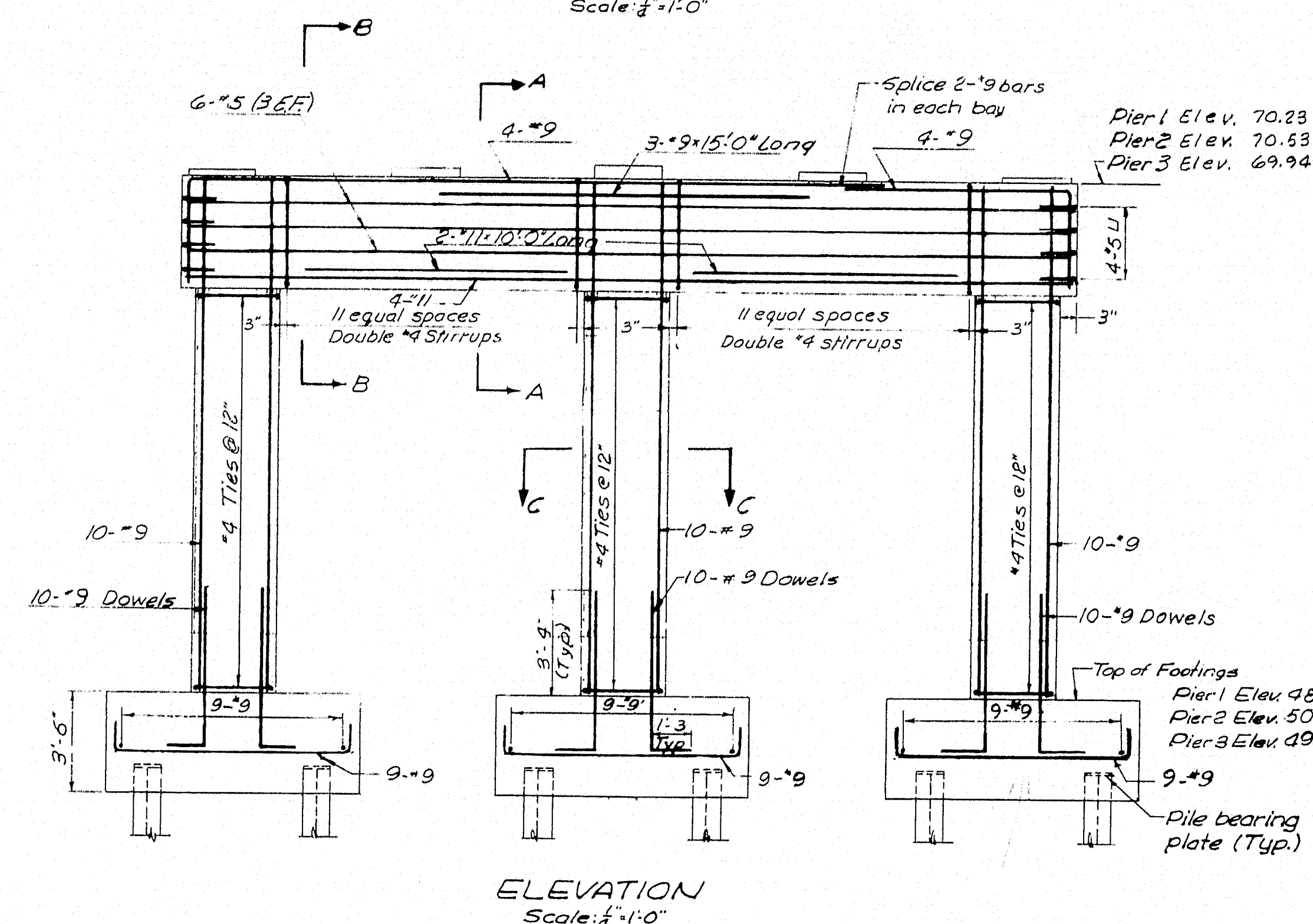
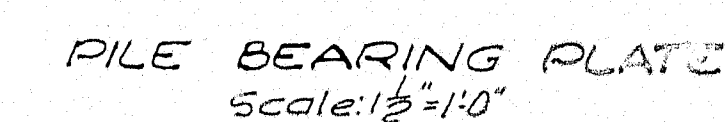
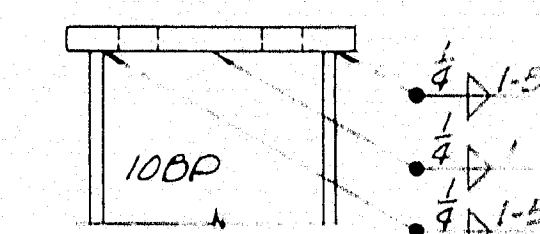
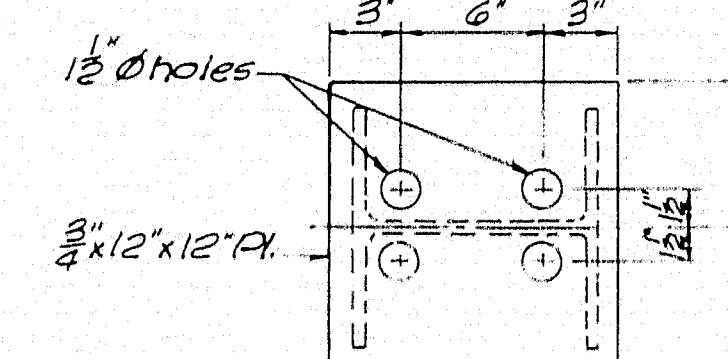
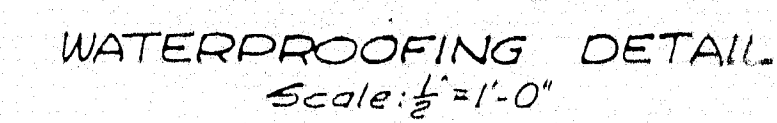
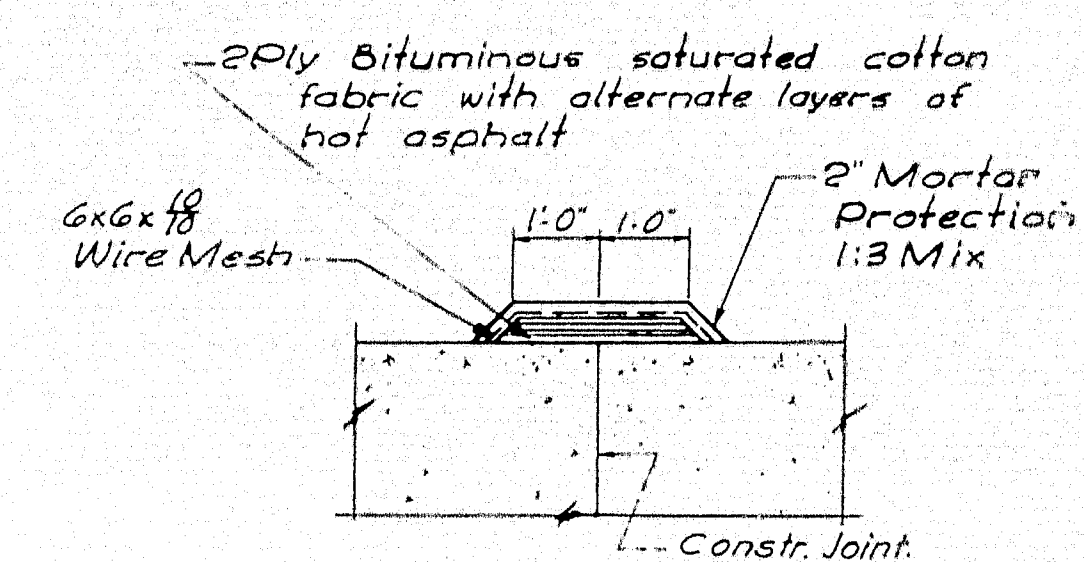
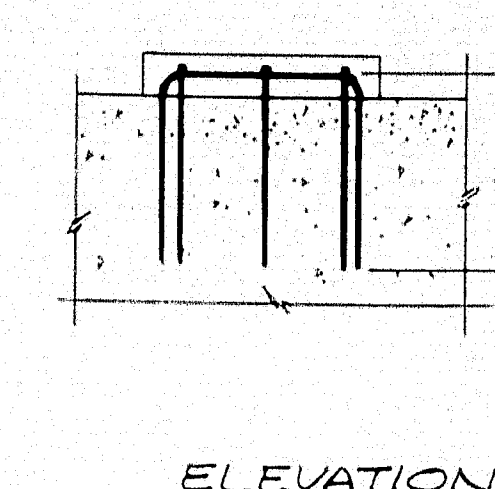
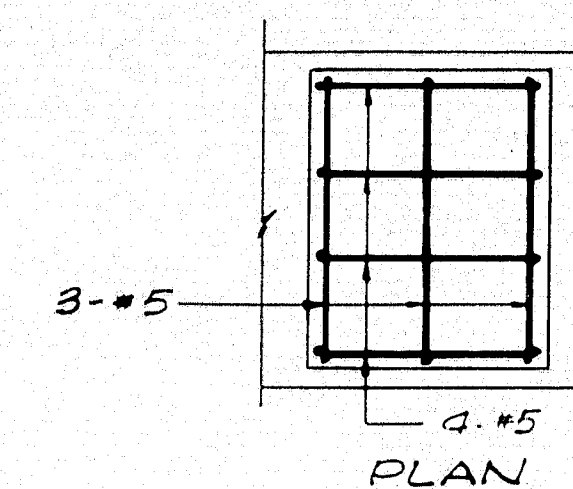
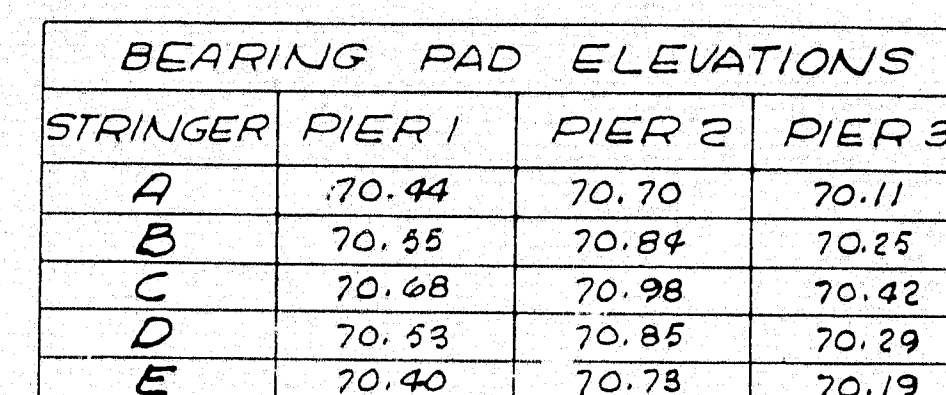
FAY, SPOFFORD & THORNDIKE, INC.  
ENGINEERS  
BOSTON, MASS.

DES. RHW  
DR. RS  
CHK. AHR  
APPD.

M-1779





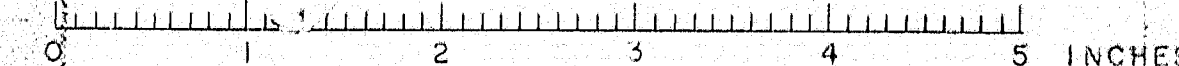


- ### Construction Notes
1. Reinforcing steel to have 2" min. concrete cover unless otherwise noted.
  2. All bar splices to lap 20 diameters (12" min.) unless otherwise noted.
  3. All bar embedments to be 35 diameters unless otherwise noted.
  4. Bearing pads to be of sufficient height to permit bush hammering to the proper elevation.
  5. All bearing pads to be placed integrally with the pier and abutments.
  6. All exposed corners except on bearing pads to have a  $\frac{1}{4}$ " chamfer. Bearing pads to have rounded edges.
  7. Reinforcing steel in or beneath bearing pads to be positioned to clear swedge anchor bolts. For swedge anchor bolts see bearing types on Sh.No. 33

STATE HIGHWAY COMMISSION AUGUSTA, MAINE		
PORTLAND-YARMOUTH INTERSTATE		
BAYVIEW STREET OVER INTERSTATE		
PIER DETAILS		
SHEET NO. 30 OF 121	SCALE: AS NOTED	

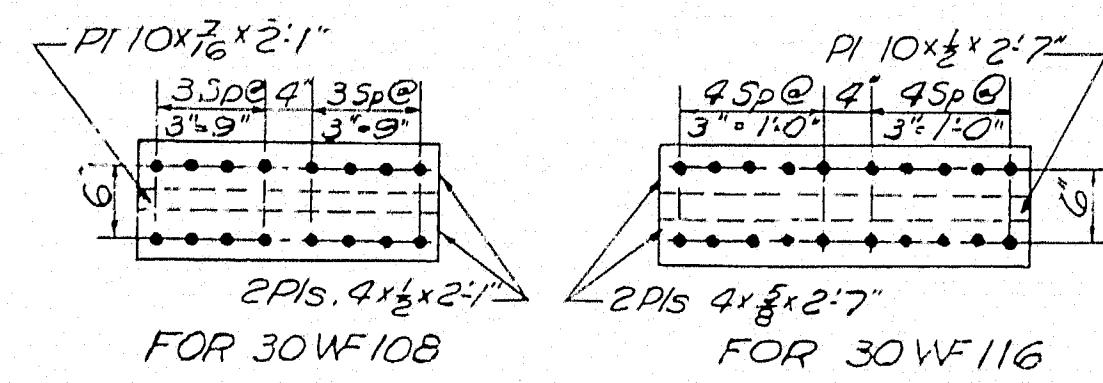
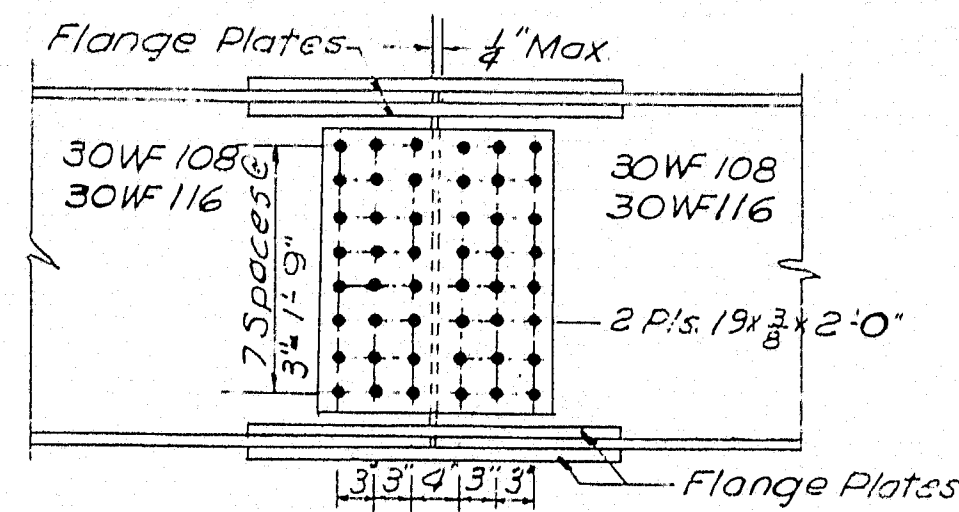
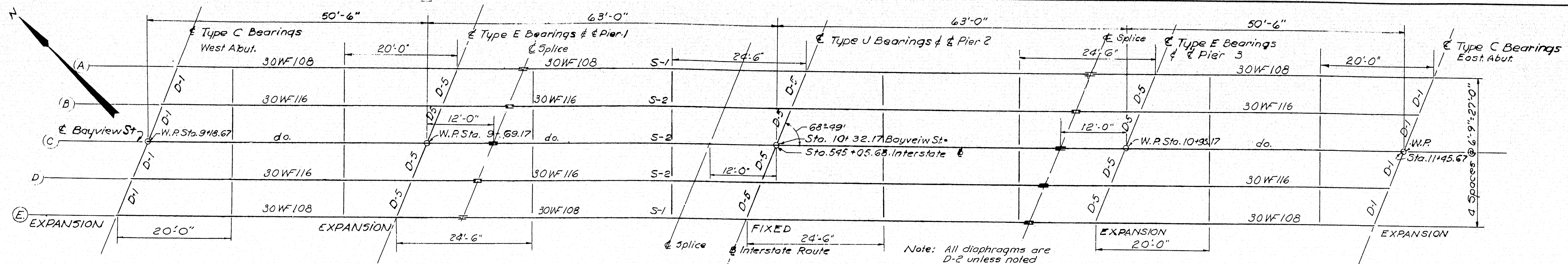
FAY, SPOFFORD & THORNDIKE, INC. Qm-14  
ENGINEERS BOSTON, MASS. 55

M-178C



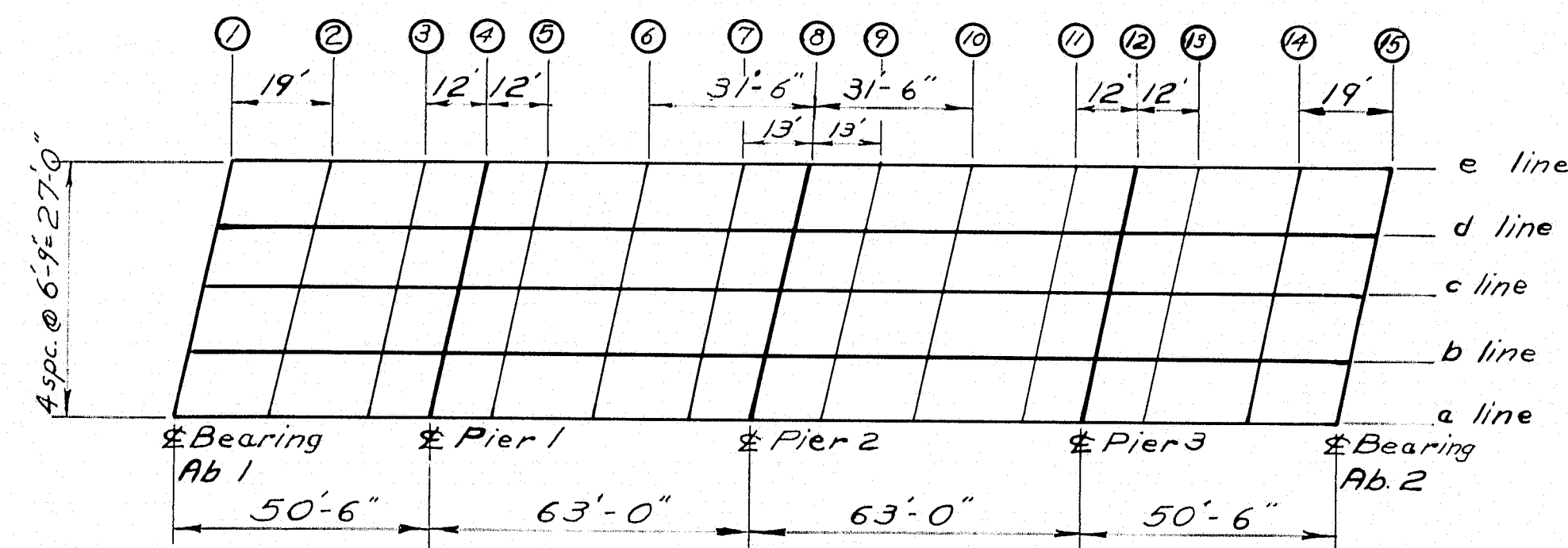


Note: Where rolled stringers have Cover Plates, the steel for both shall conform to A.S.T.M. A-373. All other structural steel shall conform to A.S.T.M. A-7 or A-373 unless specified otherwise.



Note: All splices to be made with 3/4" rivets or high strength bolts in 1/2" plates.  
STRINGER SPLICE DETAILS  
(For 30WF108 to 30WF108)  
(For 30WF116 to 30WF116)  
Scale: 1"=10'

BLOCKING PLAN



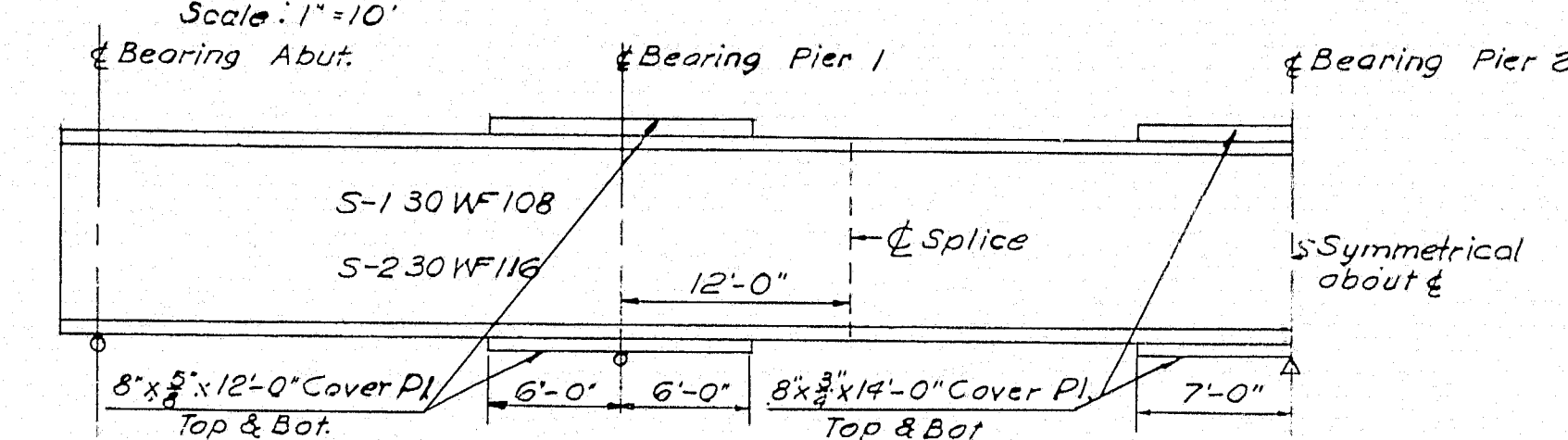
BLOCKING TABLE \*

Point	Line a	Line b	Line c	Line d	Line e
① Bearing Ab1	73.79	73.95	74.12	74.00	73.88
②	73.99	74.14	74.30	74.18	74.07
③	74.09	74.24	74.40	74.27	74.15
④ Pier 1	74.13	74.28	74.44	74.30	74.17
⑤	74.20	74.35	74.50	74.36	74.23
⑥	74.29	74.42	74.56	74.42	74.30
⑦	74.26	74.39	74.53	74.39	74.25
⑧ Pier 2	74.22	74.36	74.49	74.34	74.20
⑨	74.22	74.34	74.48	74.33	74.18
⑩	74.18	74.30	74.42	74.27	74.13
⑪	74.04	74.16	74.28	74.12	73.96
⑫ Pier 3	73.93	74.05	74.17	74.00	73.84
⑬	73.85	73.96	74.08	73.91	73.75
⑭	73.68	73.78	73.90	73.73	73.57
⑮ Bearing Ab2	73.42	73.53	73.64	73.46	73.29

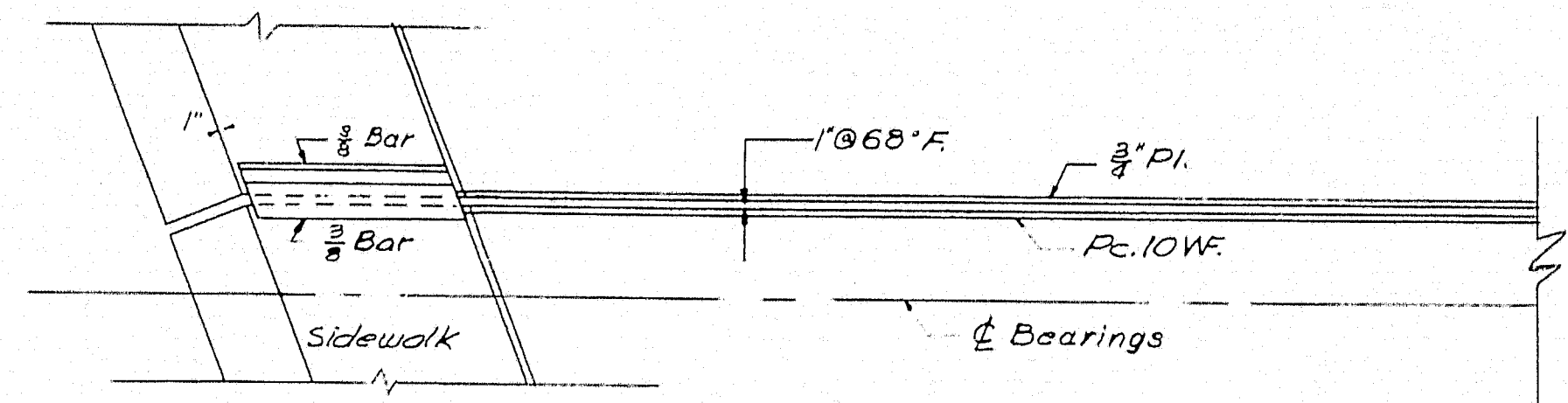
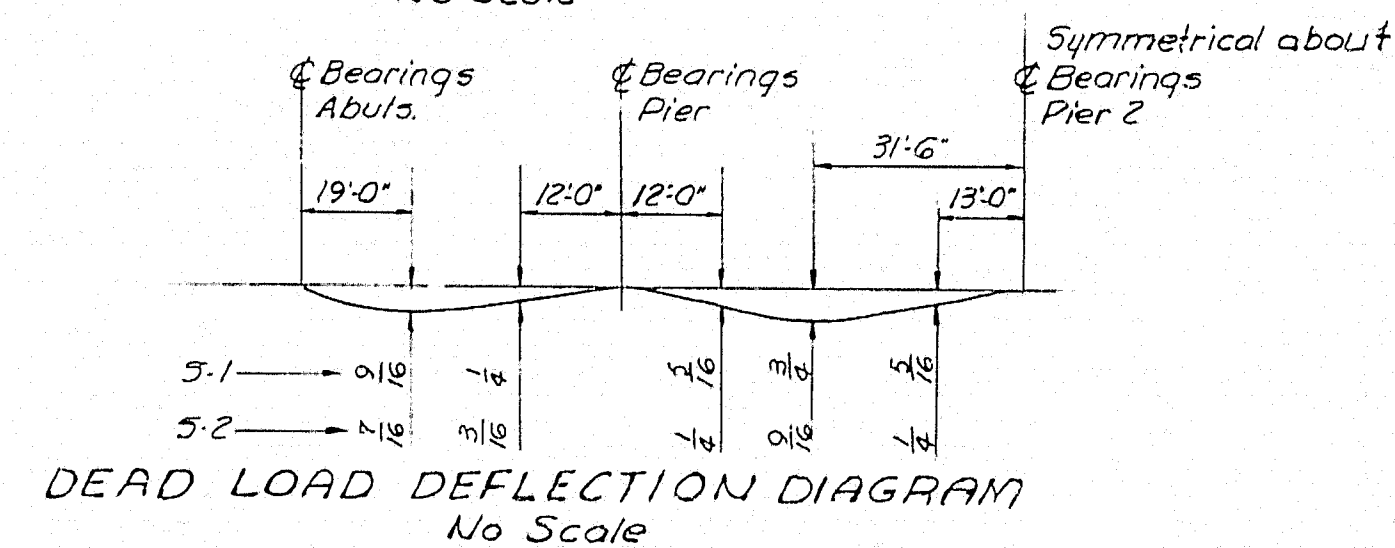
\* Bottom of slab elevations.

Added: 9/14/61

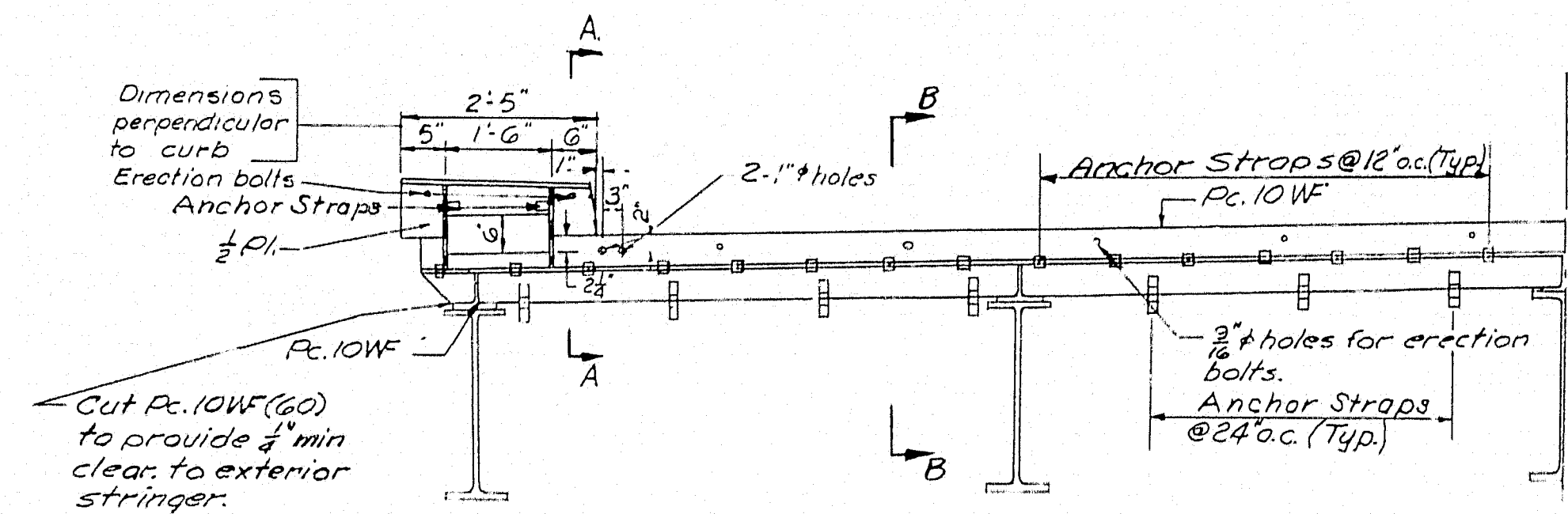
FRAMING PLAN



STRINGER ELEVATION



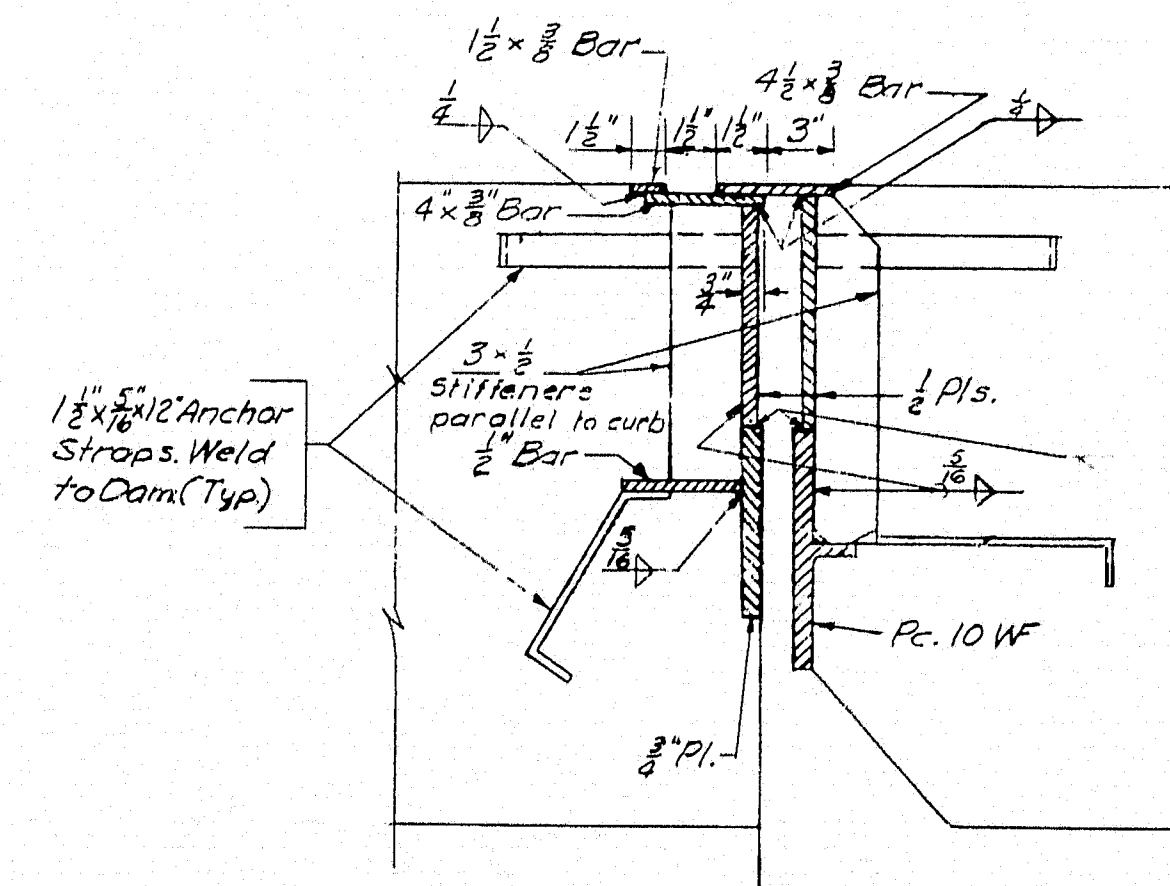
PLAN



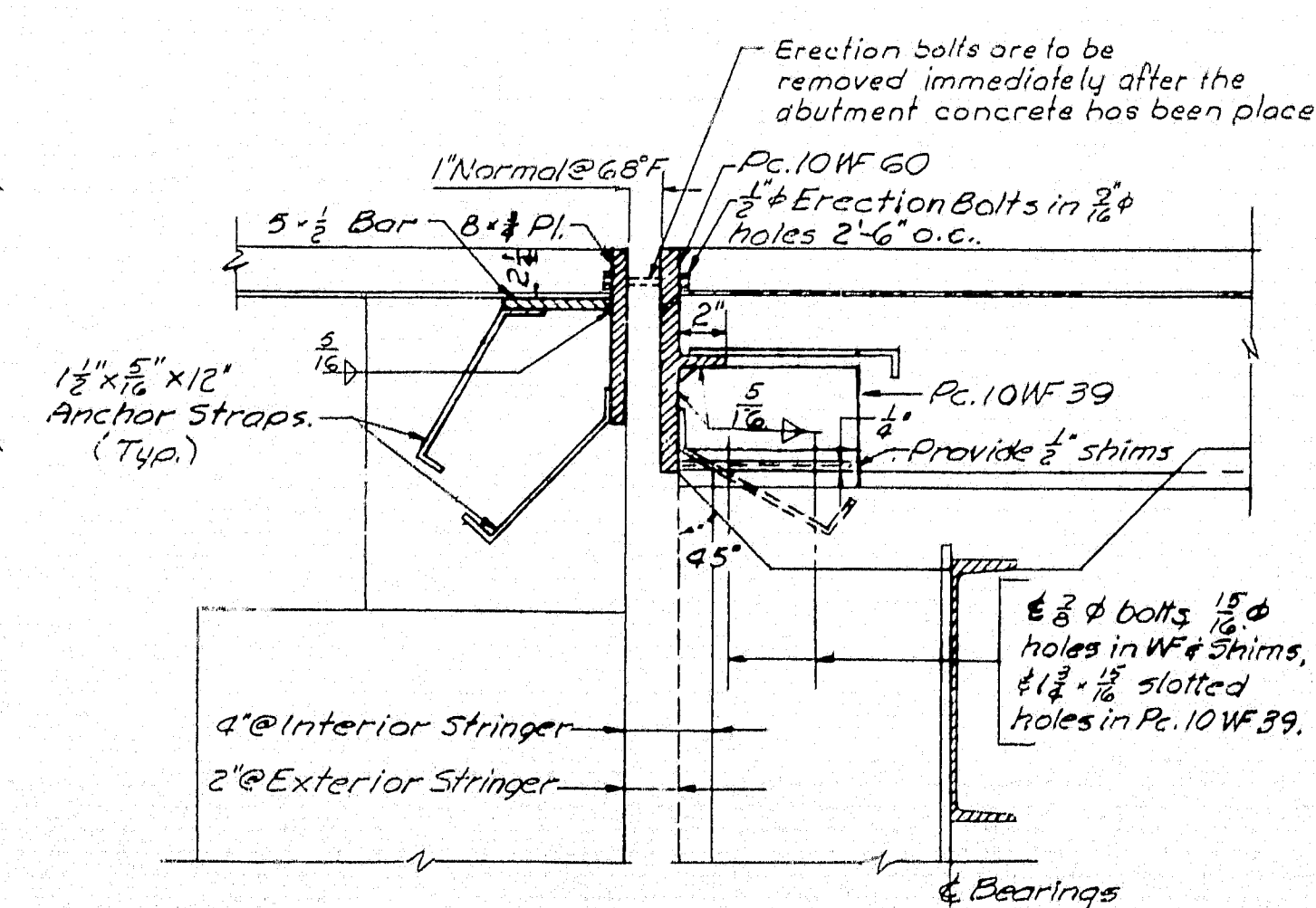
ELEVATION

FRAMING NOTES

- For diaphragm and bearing details see Sheet No. 33
- All dimensions shown on framing plan are horizontal
- Stringers not to be cambered but shall be erected with natural bow up. Camber to follow road profile to be obtained by angular adjustment at splices.



SECTION A-A



SECTION B-B

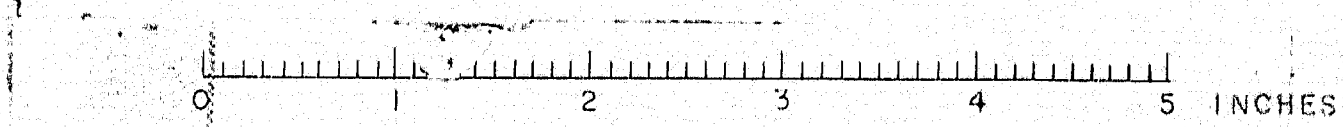
EXPANSION DAM DETAILS

STATE HIGHWAY COMMISSION AUGUSTA, MAINE
PORTLAND-YARMOUTH INTERSTATE
BAYVIEW STREET OVER INTERSTATE
FRAMING PLAN AND DETAILS
SHEET NO. 31 OF 121
SCALE: AS NOTED

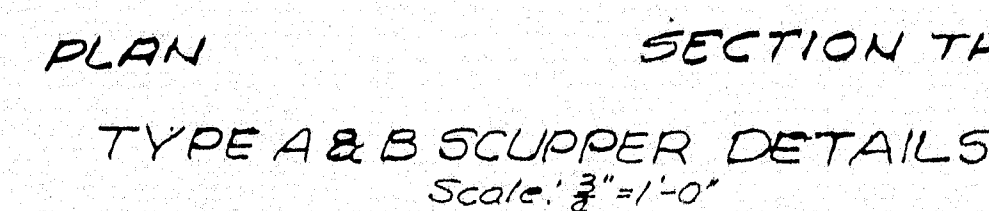
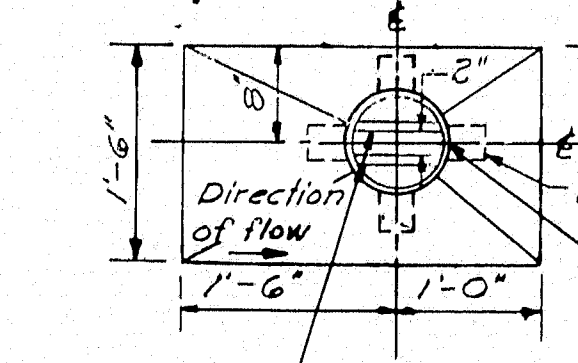
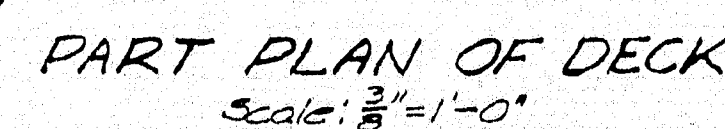
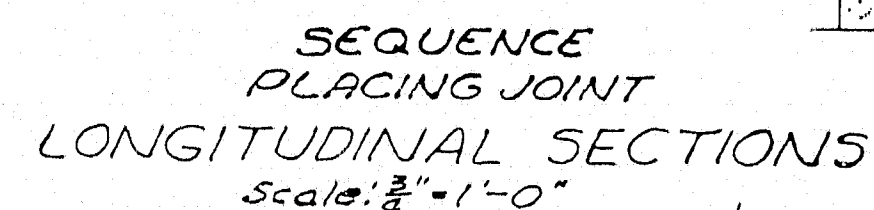
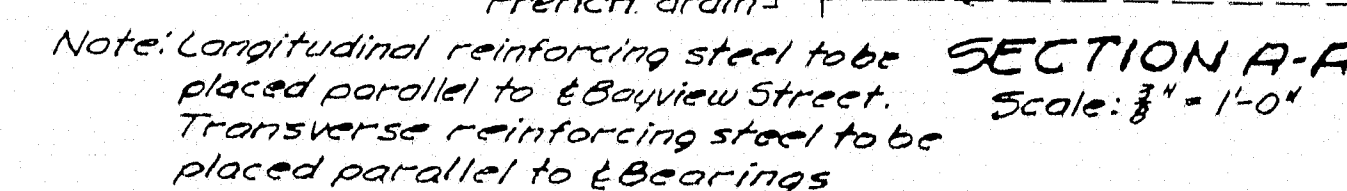
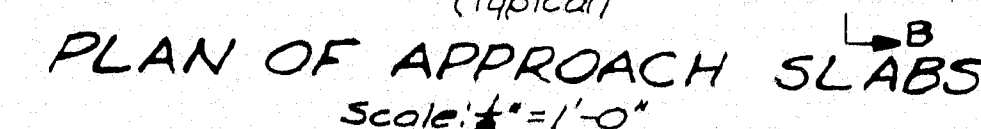
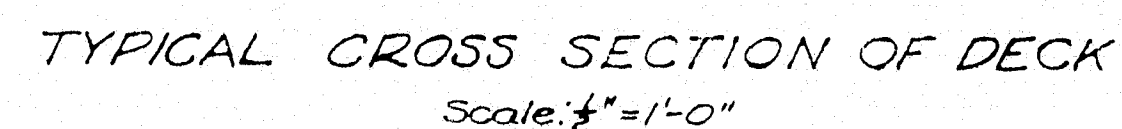
RAY, SPOFFORD & THORNDIKE, INC.  
ENGINEERS  
DORCHESTER, MASS.

Qm-14  
56

M-1781



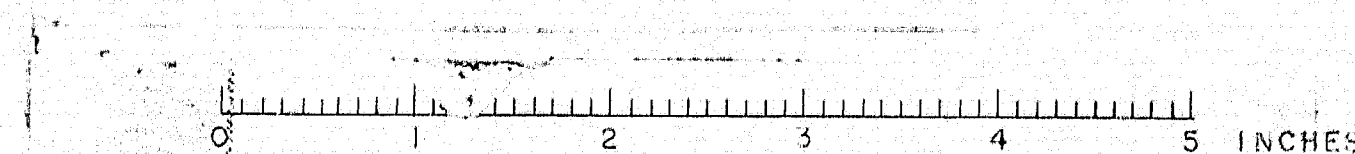




Notes: For location of scuppers see  
Sheet No. 28  
For construction notes, see  
Sheet No. 30

FAY, SPOFFORD & THORNDIKE, INC  
ENGINEERS BOSTON, MASS.

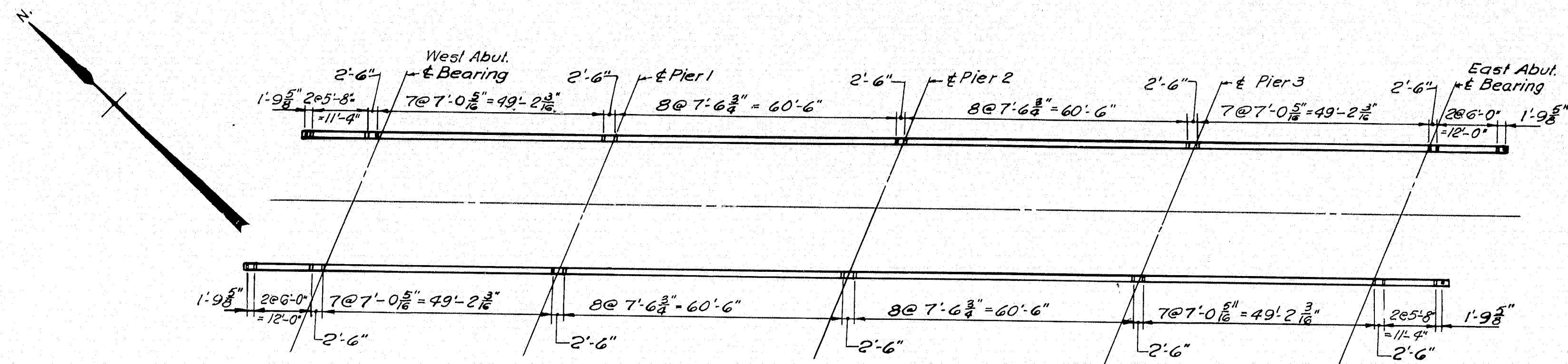
M-1782



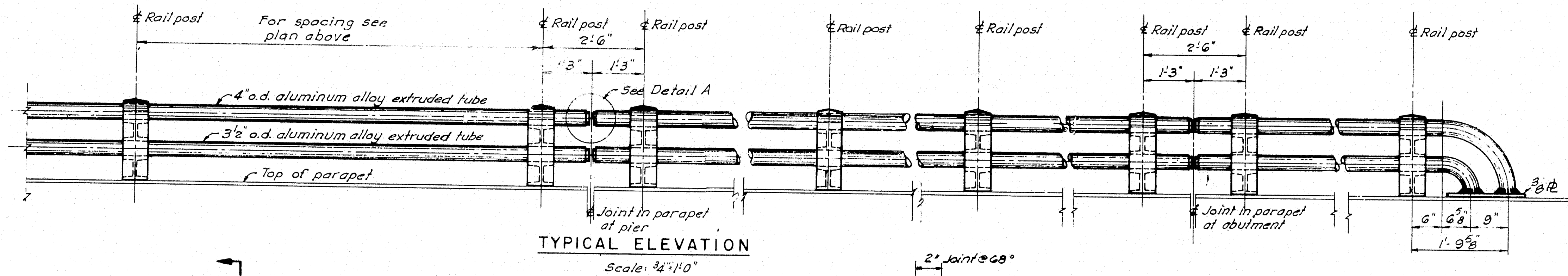




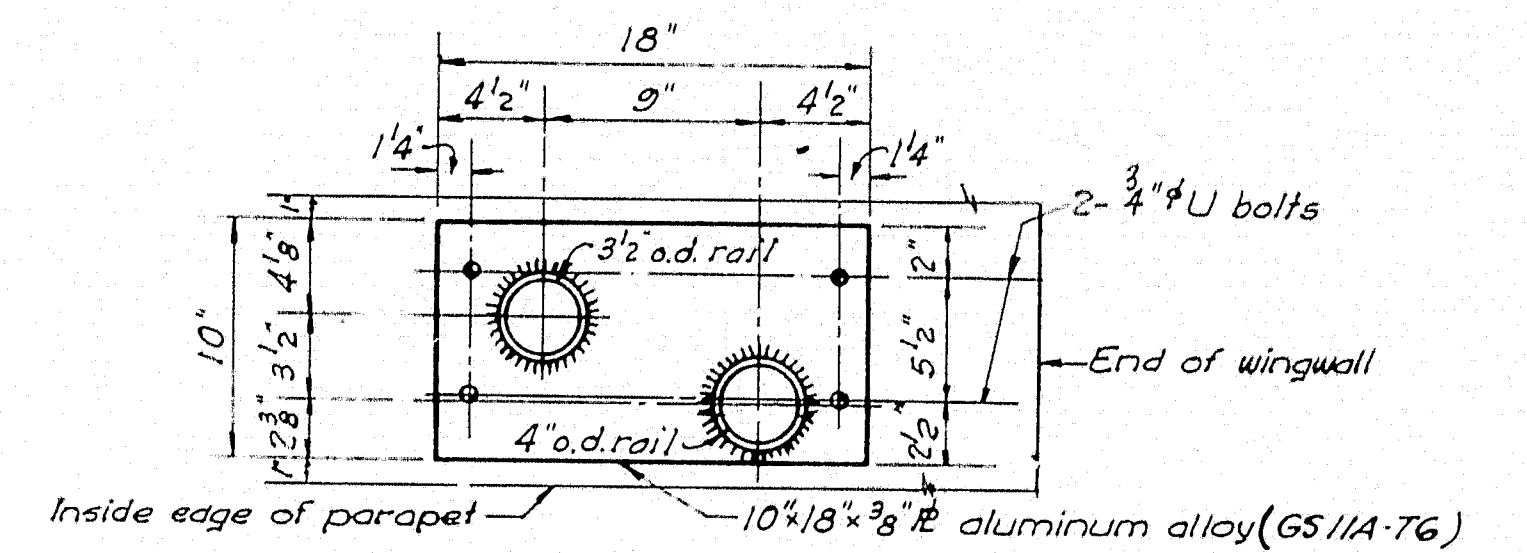




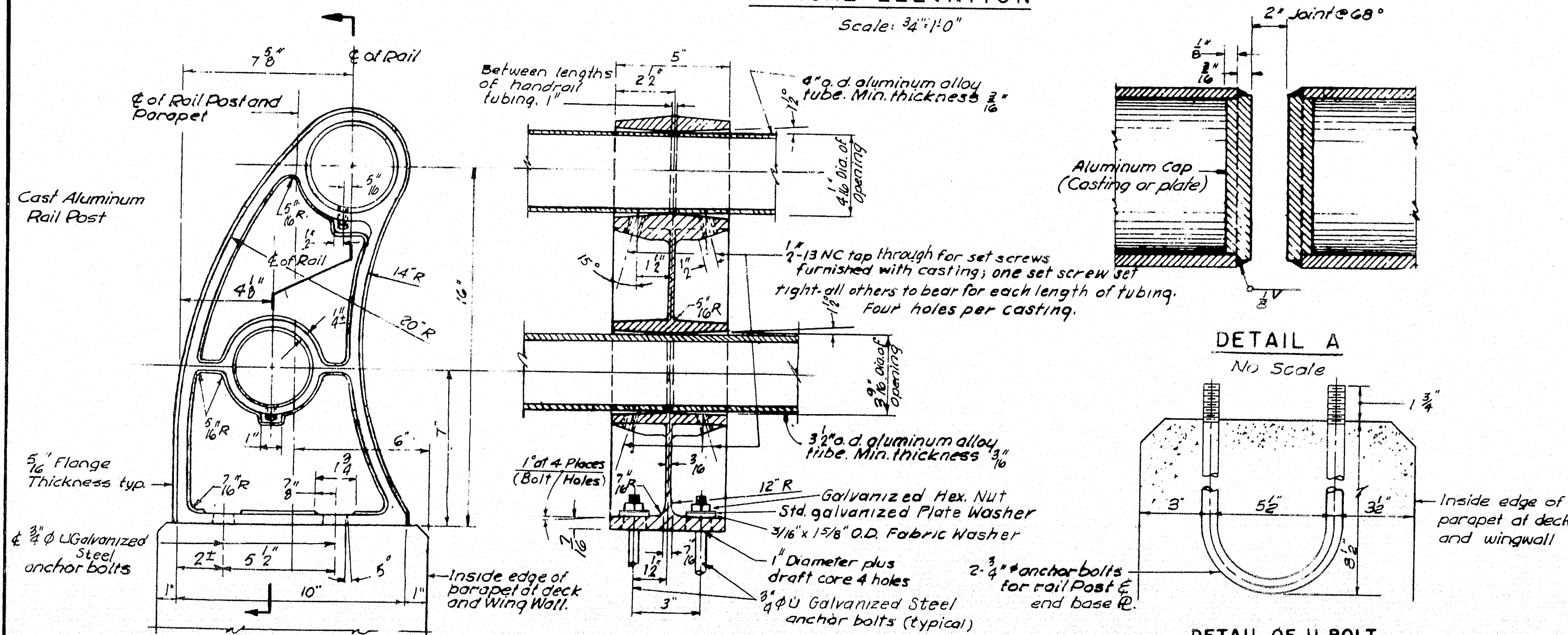
PLAN OF RAILING



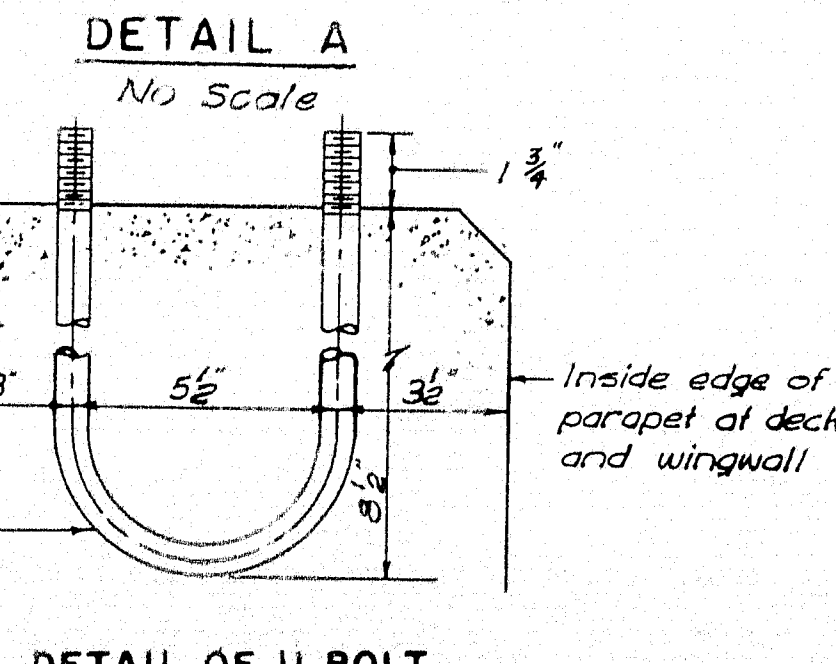
TYPICAL ELEVATION  
Scale: 3/4"=1'-0"



DETAIL OF END  
BASE PLATE  
Scale: 1 1/2"=1'-0"



RAIL POST DETAIL  
Scale: 3/4"=1'-0"



DETAIL A  
No Scale

DETAIL OF U BOLT  
FOR RAIL POST  
Scale: 3/4"=1'-0"

- NOTES:
1. The bottom of each railing post shall be thoroughly coated with an aluminum impregnated caulking compound before installation.
  2. Railing post to be set normal to parapet.
  3. As far as practicable, rail bars shall have a minimum length of two panels and be continuous thru at least one rail post. There shall be only one rail bar splice per post.

4. Aluminum alloy shims in number equal to 50% of rail posts, shall be provided for erection of posts.

STATE HIGHWAY COMMISSION AUGUSTA, MAINE		
PORTLAND-YARMOUTH INTERSTATE		
BAYVIEW STREET OVER INTERSTATE		
RAILING DETAILS		
SHEET NO. 34 OF 121	SCALE: AS NOTED	

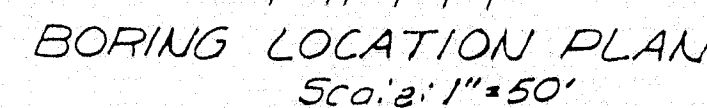
FAY, SPOFFORD & THORNDIKE, INC.  
ENGINEERS  
BOSTON, MASS.

Om-14  
58

M-1784



## YARMOUTH



### GENERAL NOTES

1. BORINGS WERE MADE BY THE MAINE STATE HIGHWAY COMMISSION DECEMBER 1956 AND FEBRUARY 1957.
2. FIGURES IN COLUMN ① = BLOWS PER FOOT ON CASING.  
FIGURES IN COLUMN ② = BLOWS PER FOOT ON SAMPLER FOOT.
3. ELEVATIONS ARE REFERRED TO MEAN SEA LEVEL.
4. ADDITIONAL SOIL INFORMATION OBTAINED FROM LABORATORY TESTS IS AVAILABLE FROM MAINE STATE HIGHWAY COMMISSION.

**LEGEND**

AS: CASING WAS DRIVEN AFTER SAMPLING.  
C: DIAMETER OF CASING IN INCHES.  
H: WEIGHT OF HAMMER IN POUNDS.  
D: DROP ON CASING IN INCHES.  
DS: DROP ON SAMPLER ROD IN INCHES.  
BR: CASING WAS DRIVEN WASHING AHEAD OF CASING.  
AV:  
\* : WEIGHT OF HAMMER  
\*\* : WEIGHT OF RODS  
J: SAMPLER DRIVEN BY STATIC LOAD NOT EXCEEDING 5 TONS

STATE HIGHWAY COMMISSION AUGUSTA, MAINE		
PORTLAND-YARMOUTH INTERSTATE		
BAYVIEW STREET OVER INTERSTATE		
<b>BORING DATA</b>		
SHEET NO. 35 OF 121	SCALE: AS NOTED	
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BOSTON, MASS.		Qm-10 59

M-1785

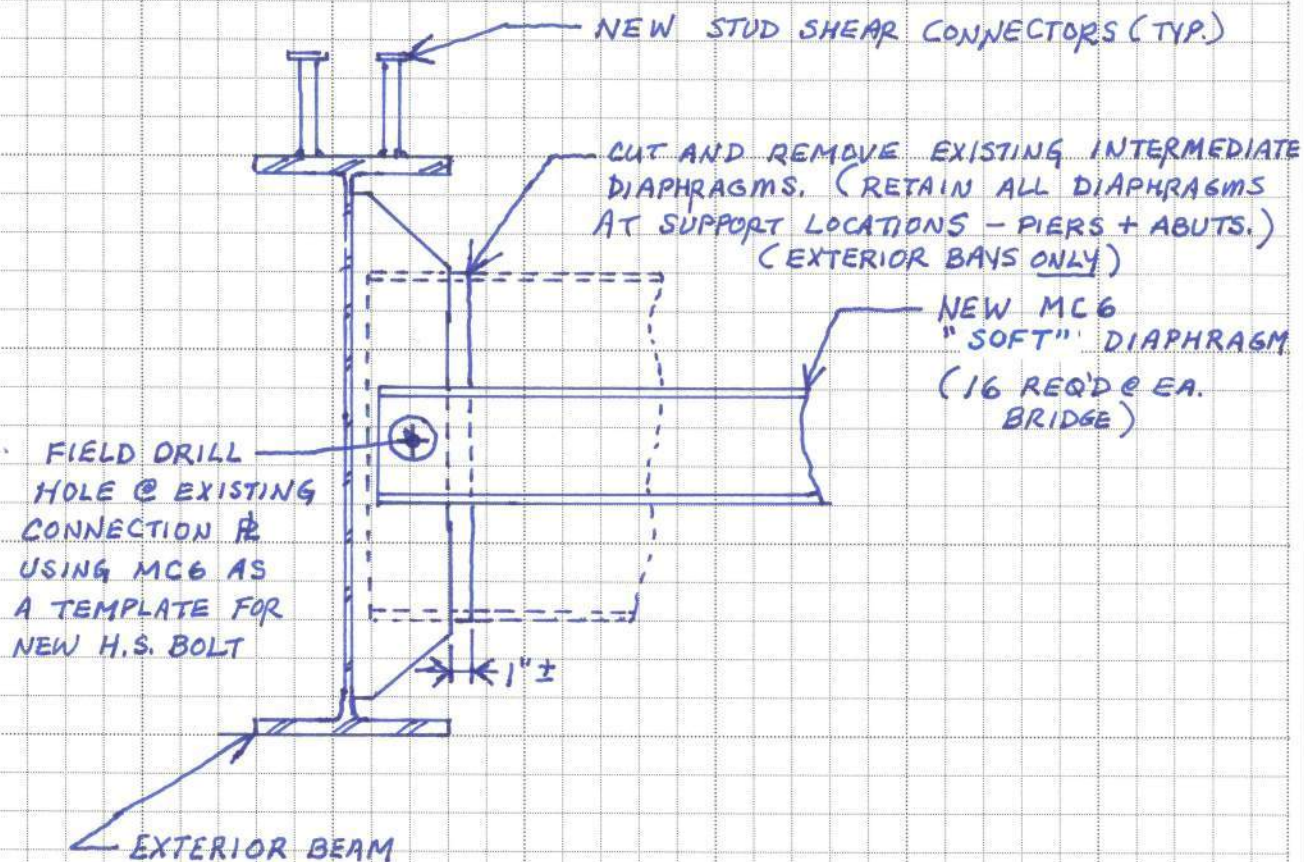


# Appendix E

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## Retrofit Concepts



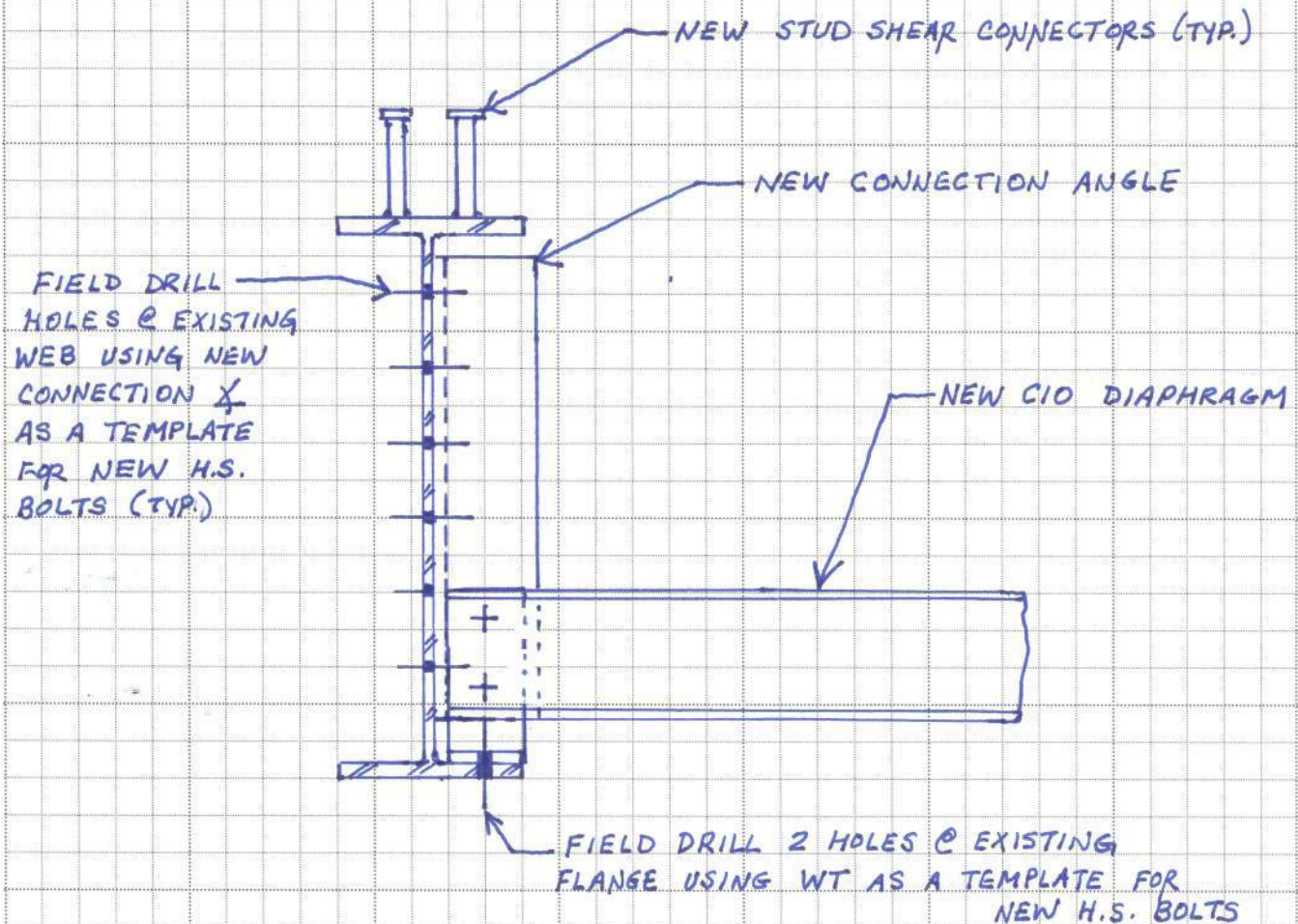


### DIAPHRAGM RETROFIT

NOT TO SCALE

Bayview only



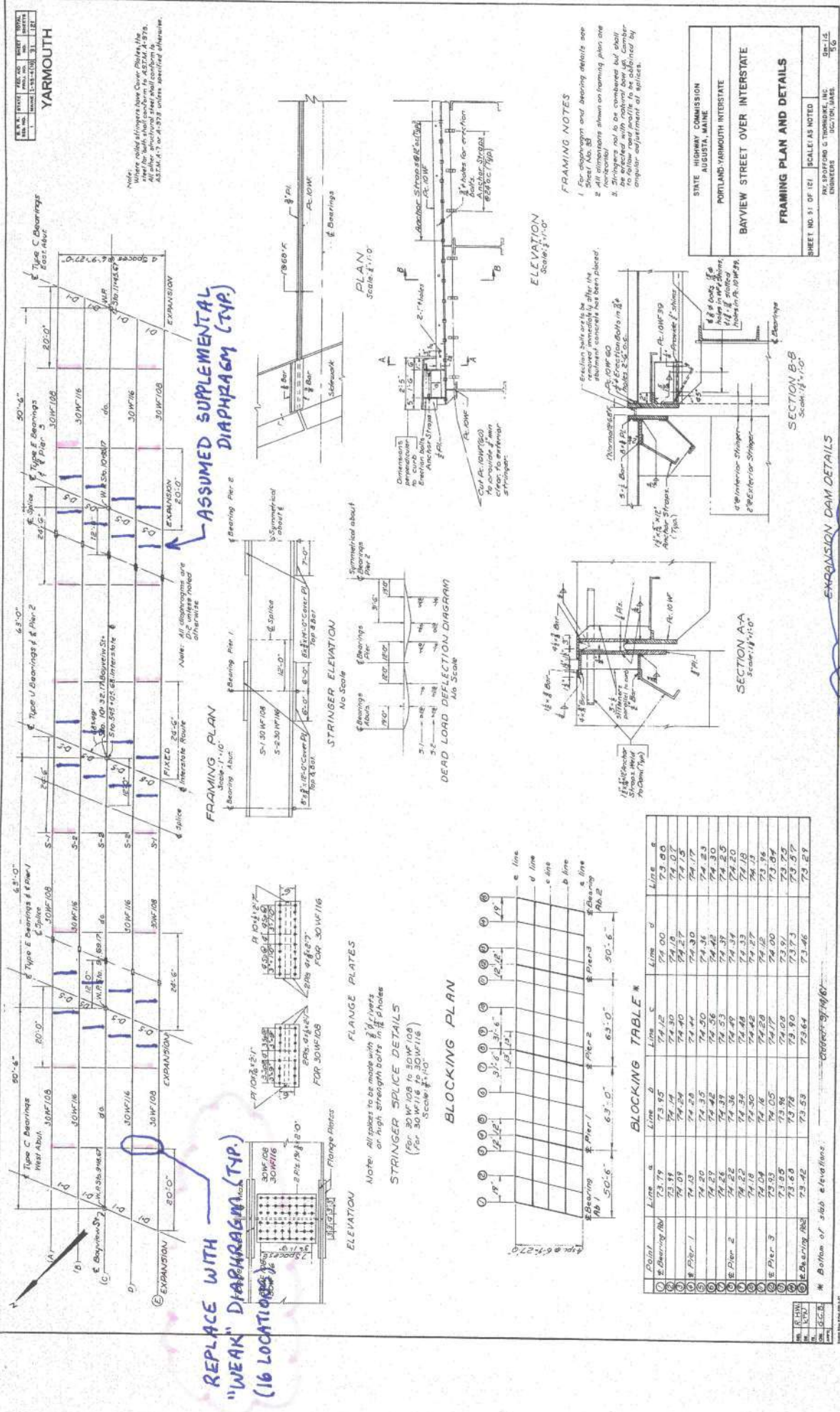


SUPPLEMENTAL DIAPHRAGM

NEAR PIER SUPPORTS

NOT TO SCALE





ASSUMED LOCATIONS OF  
SUPPLEMENTAL  
DIAPHRAGMS

24 ±

**BLOCKING TABLE**

Point	Line a	Line b	Line c	Line d	Line e
1	73.79	73.85	74.12	74.00	73.80
2	73.91	74.14	74.40	74.27	74.15
3	74.03	74.28	74.44	74.30	74.17
4	74.20	74.35	74.50	74.36	74.23
5	74.27	74.42	74.56	74.42	74.30
6	74.28	74.49	74.53	74.37	74.25
7	74.25	74.36	74.49	74.34	74.20
8	74.15	74.30	74.45	74.33	74.18
9	74.18	74.48	74.48	74.35	74.15
10	74.04	74.16	74.27	74.15	73.94
11	73.93	74.05	74.17	74.00	73.84
12	73.85	73.96	74.08	73.91	73.75
13	73.68	73.78	73.90	73.73	73.57
14	73.42	73.53	73.64	73.46	73.29

\* Bottom of slab elevations.

Checked by: J. B. THOMPSON



# Appendix F

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## Miscellaneous Information

**BAYVIEW STREET BRIDGE (#5835) - PRELIMINARY CONSTRUCTION SCHEDULE**

#	ACTIVITY	Duration (days)	Notes
0	Mobilization, construction sign package installation	14	
1	Install temporary signals and portable concrete barrier or drums	2	shift traffic to south portion
2	Remove existing bridge pavement on northerly side	1	
3	Install shielding under bridge and along sides	5	temporary lane/shldr closures on I-295
4	Install temporary anchored barrier	1	
5	Strengthen northern curb	3	
6	Sawcut and demo portion of northern curb on bridge and wingwalls	2	
7		0	shift traffic to north portion
8	Demo southern portion of deck	4	
9	Demo approach slab, backwalls, upper wingwalls	2	
10	Retrofit exterior bay diaphragms	2	
11	Install supplemental diaphragms near piers	2	
12	Form, tie, and place abutment and wings	4	
13	Form deck slab and install shear studs	7	
14	Place and tie deck reinforcing steel	4	
15	Place and cure deck slab and expansion joint header/armor	7	
16	Place and cure buried approach slabs	5	
17	Backfill, approach roadway work	2	
18	Form, tie, and place curb	7	
19	Install bridge railing and approach railing	2	
20	Groove deck and complete portion of approach work	3	
21	Install temporary braced barrier	1	shift traffic to south portion
22	Demo northern portion of deck	4	
23	Demo approach slab, backwalls, upper wingwalls	2	
24	Retrofit exterior bay diaphragms	2	
25	Install supplemental diaphragms near piers	2	
26	Form, tie, and place abutment and wings	4	
27	Form deck slab and install shear studs	7	
28	Place and tie deck reinforcing steel	4	
29	Place and cure deck slab and expansion joint header/armor	7	
30	Place and cure buried approach slabs	5	
31	Backfill, approach roadway work	2	
32	Form, tie, and place curb	7	
33	Install bridge railing and approach railing. Groove deck	3	
34	Remove bracing from barrier so traffic can be relocated to opposite face	1	shift traffic to north portion
35	Form, tie, place , and cure sidewalk on bridge	8	
36	Construct approach sidewalk	0	concurrent with on-bridge work
37	Remove barrier and install compression seals	1	open to 2 lanes w/ sidewalk
38	Substantial completion	0	
39	Remove shielding and temporary signals	3	temporary lane/shldr closures on I-295
40	Punch list work, finish approaches, and demobilization	20	
41	Project completion	0	
ESTIMATED CONSTRUCTION DURATION		162	April thru Mid Octoboer
ESTIMATED ONE LANE DURATION		123	May thru September

# Appendix G

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## Traffic and Accident Data

# STATE OF MAINE

## INTERDEPARTMENTAL MEMORANDUM

FILE: Cumb. Cty

CC: I-295

Date of Request: 11/7/2017

Return: 11/20/2017

Latest Date Needed By

11/20/2017

To: **Ed Hanscom**

Dept.: MDOT, Bridge Program

From: **Janet Damren 4-3462**

Dept.: Bridge Program

Subject: **Request for Traffic Information**

Project Manager: **Joseph Stilwell**

TOWN(S): Yarmouth

P.I.N. **22380.00**

Consultant Proj ☐

COUNTY: Cumberland

ROUTE: Bayview Street & I-295

LOCATION/  
DESCRIPTION:

Bayview Street/Interstate 295 Bridge #5835 over Interstate 295 located 0.09 of a mile east of Spring Street.

	Roadway Changes or Relocation (Attach Sketch)	Turning Movement needed (Provide Locations under Comments)	Other Please Describe Under Comments
Please Check Box if Applicable:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Prep By: MAM

Sec. 1

Sec. 2 NB

Sec. 2 SB

Sec. 4

Sec. 5

Description of Sections

Yarmouth -  
Bayview St. W/O  
Old Shpyard Rd.

Yarmouth - I-295  
NB S/O Off Ramp  
to US 1 (N Jct.)

Yarmouth - I-295  
SB S/O On Ramp  
from US 1 (N Jct.)

1 Latest AADT (Year)		<u>1900(2016)</u>	<u>25280(2014)</u>	<u>26370(2014)</u>		
2 Current <b>2019</b> AADT		<u>1900</u>	<u>25280</u>	<u>26370</u>		
3 Future <b>2029</b> AADT		<u>2000</u>	<u>26540</u>	<u>27690</u>		
4 Future <b>2039</b> AADT		<u>2090</u>	<u>27810</u>	<u>29010</u>		
5 DHV - % of AADT		<u>11%</u>	<u>12%</u>	<u>13%</u>	<u>%</u>	<u>%</u>
6 Design Hourly Volume		<u>230</u>	<u>3337</u>	<u>3771</u>		
7 % Heavy Trucks (AADT)		<u>4%</u>	<u>9%</u>	<u>9%</u>	<u>%</u>	<u>%</u>
8 % Heavy Trucks (DHV)		<u>4%</u>	<u>5%</u>	<u>5%</u>	<u>%</u>	<u>%</u>
9 Direct.Dist. (DHV)		<u>70%</u>	<u>100%</u>	<u>100%</u>	<u>%</u>	<u>%</u>
10 18-KIP Equivalent P 2.0		<u>43</u>	<u>2412</u>	<u>2633</u>		
11 18-KIP Equivalent P 2.5		<u>41</u>	<u>2297</u>	<u>2508</u>		

Notes or Remarks: 18-Kip ESALS is based on 20 year life

**PLEASE PROVIDE: (1) PIN NUMBER, (2) THE CURRENT & FUTURE YEARS FOR WHICH YOU WANT AADT CALCULATED, AND SEND TO MIKE MORGAN. ( A LOCATION MAP IS NO LONGER NEEDED.) TRAFFIC REQUESTS WILL BE FILLED ON A FIRST COME / SERVE BASIS. PLEASE SEND WHEN PROJECT KICKS OFF!!!**  
Need Only Data Items Numbered

Comments: